The Prehistory of the Northwest Coast

R. G. Matson
Gary Coupland

The Prehistory of the Northwest Coast

This page intentionally left blank

The Prehistory of the Northwest Coast

R. G. Matson
Gary Coupland

Routledge
Taylor & Francis Group
LONDON AND NEW YORK

Replaces cloth edition of this book produced by Emerald Group Publishing under ISBN 978-0-12-480260-5 in 2007. Originally published by Academic Press in 1994.

First published 2009 by Left Coast Press, Inc.

Published 2016 by Routledge
2 Park Square, Milton Park, Abingdon, Oxon OX14 4RN
711 Third Avenue, New York, NY 10017, USA

Routledge is an imprint of the Taylor & Francis Group, an informa business

Copyright © 2009 by Left Coast Press, Inc.

All rights reserved. No part of this book may be reprinted or reproduced or utilised in any form or by any electronic, mechanical, or other means, now known or hereafter invented, including photocopying and recording, or in any information storage or retrieval system, without permission in writing from the publishers.

Notice:
Product or corporate names may be trademarks or registered trademarks, and are used only for identification and explanation without intent to infringe.

Library of Congress Cataloguing-in-Publication Data available from the publisher.

ISBN 13: 978-1-59874-459-0 (pbk)

To the memory of
Charles E. Borden,
the father of British Columbian and,
indeed, Northwest Coast archaeology.

This page intentionally left blank

Contents

Preface xiii
Acknowledgments xv

1

The Evolution of Cultural Complexity on the Northwest Coast

Introduction to the Problem 1
The Northwest Coast at Contact 2
Ethnographic Hunters and Gatherers 4
The Developed Northwest Coast Pattern 5
Synopsis 9

2
The Northwest Coast Cultural Area

Introduction 11
Traditional Definitions of the Northwest Culture Area 12
Summary of Commonalities and Differences 21
Environmental and Cultural Commonalities 21
Environmental and Cultural Differences 29

3
History of Archaeological Research

Introduction 37
Late Nineteenth and Early Twentieth Century Investigations 38
Mid-Twentieth Century Investigations 41
Recent Research 44
Synopsis 47

4
The Initial Colonization of the Northwest Coast

Introduction 49
Peopling of the New World 50
Routes for Early Human Colonization of the Northwest Coast 59
The Ice-Free Corridor 59
Direct Route from Alaska 61
Coastal Route 62
The Denali Complex 65
The Initial Occupation of South and Central Coasts 66
The Protowestern Tradition 66
Old Cordilleran Culture 68
The Glenrose Site 70
Bear Cove 74
Other Old Cordilleran Sites 77
Summary 81
The North Coast Microblade Tradition 82
Southeastern Alaska 84
Queen Charlotte Islands 87
Skeena Valley 90

Central Coast of British Columbia 91
Summary of the North Coast Microblade Tradition 94
Chapter Summary 94

5

The Emergence of Distinctive Coastal Cultures

Central and South Coast Cultures 97
Gulf of Georgia 98
Mayne Phase 115
South Coast 118
Central Coast 122
Summary of the Central and South Coasts 124
The Emergence of Distinctive Coastal Cultures on the North Coast 125
Prince Rupert Harbour 126
Lower Skeena River 129
Southeastern Alaska 132
Queen Charlotte Islands 136
Central Coast of British Columbia 139
Summary of the North Coast 140
Chapter Summary 142

6

The Development of Cultural Complexity

Introduction 145
Ideas for the Origins of the Developed Northwest Coast Pattern 146
The Locarno Beach Phase 154
Locarno Beach Phase Origins 161
Locarno Beach Subsistence 165
Locarno Beach Related Sites 177
South Coast 181
Labrets and Status in the Locarno Beach Phase 181
Summary of the Locarno Beach Phase 182
The North Coast 183
Lower Skeena River 183
Prince Rupert Harbour 191
Queen Charlotte Islands 192
Southeastern Alaska 193

Central Coast of British Columbia 195
Summary of the North Coast 196
Chapter Summary 197

7

The Achievement of Cultural Complexity

Introduction 199
History of the Marpole Culture 200
The Marpole Phase 201
Marpole Interassemblage Analysis 211
Subsistence and Seasonality 222
Summary of the Marpole Phase 224
Beyond the Gulf of Georgia 225
South Coast 228
North Coast 229
Prince Rupert Harbour 229
Skeena River 236
Central Coast of British Columbia 238
Southeastern Alaska 239
Queen Charlotte Islands 240
Summary of the North Coast 240
Summary 241
Preliminary Evaluation of Evolutionary Models 242

8

Continuation of the Developed Northwest Coast Pattern

Introduction 247
The Southern Coast 248
Point St. George 248
Oregon Coast 255
The Central Coast 262
The Outer Washington Coast 262
Gulf of Georgia 267
Puget Sound 270
West Coast of Vancouver Island 272
North Coast Cultural Pattern 274
Central Coast of British Columbia 274
Prince Rupert Harbour 278

Queen Charlotte Islands 284
Southeastern Alaska 287
Summary of the North Coast 295
Chapter Summary 295

9

Review of Developments

Retrospective 299
Peopling of the Northwest Coast and Early Settlement 300
Emergence of Distinctive Coastal Cultures 301
The Developed Northwest Coast Pattern 303
The Continuation of the Developed Northwest Coast Pattern and the Emergence of the Ethnographic Cultures 305
The Future of Northwest Coast Archaeology 307

References 317
Index 353

This page intentionally left blank

Preface

Our purpose in writing this book is to present a synthesis of the current understanding of the evolution of the Northwest Coast culture. No book-length treatment of the prehistory of Northwest Coast Culture Area existed prior to this work, and we believed that there was a need for one. Results of recent investigations have allowed a synthesis of the full extent of the Northwest Coast with comparisons of the different regions within it.

We choose to focus theoretically on the development of cultural complexity. The social inequality and complex households of the historic Northwest Coast peoples not only are unique among ethnographic hunting and gathering peoples but also are topics that transcend regional archaeology. The development of cultural complexity is a leading topic in archaeology, and, thanks to the ethnographic record, the Northwest Coast is one of the few areas for which we have a good understanding of how such a social system operated among hunter–gatherers. In writing this book, we hoped to gain an understanding of cultural developments in regions for

which we did not have first-hand knowledge. The reader will find that we learned much in the process of producing this book, and our goal is to pass this knowledge along.

A single volume cannot give complete details of all sites or archaeological cultures. Thus, this book is not a tutorial for our fellow Northwest Coast archaeologists, but rather a summary and synthesis of the prehistory of the entire Northwest Coast with our perspectives on some larger archaeological issues. It should be a handy reference for archaeologists of other culture areas, for graduate students, for the interested public, and for courses on Northwest archaeology.

This book began when Professor James B. Griffin, editor of the *New World Archaeological Record*, published by Academic Press, contacted R. G. Matson in the fall of 1990 about the possibility of producing a volume on the Northwest Coast. Matson, after producing a tentative outline, asked Gary Coupland to join him. After several revisions, an outline and schedule acceptable to all parties were produced, and this volume was on its way. Editors at Academic Press, including Rick Roehrich, Marvin Yelles, and Dean Irey, saw this volume from the conception through the production cycle.

Matson had long intended to produce a synthetic volume on the Northwest Coast, although not so soon after the completion of his *Origins of Southwestern Agriculture* (University of Arizona Press, 1991). However, Matson's recent investigations at Crescent Beach, British Columbia, in 1989–1990 filled some notable gaps in surprising ways (at least to Matson), and recent research by others made it an appropriate time to attempt such a volume. No comparable work existed for the Northwest Coast, yet almost all culture areas in North America are covered in synthetic volumes.

In terms of basic division, Matson was responsible for contributions regarding the South and Central Coasts, and Coupland wrote the contributions dealing with the North Coast. Chapter 3 was written primarily by Coupland, and Matson contributed the majority of Chapter 4. The authors' respective contributions to the other chapters were roughly equal.

Acknowledgments

Although we did make a number of new discoveries along the way, this book is not really an original work of research. It is more a synthesis—from a perspective that we think is important—of a variety of research, almost all of which has been done since World War II. The merit of this work results from the various original investigations, including our own. We acknowledge our indebtedness to archaeologists engaged in research in the Northwest Coast Culture Area. We are particularly grateful to those who went so far as to publish their work so that it was available. We are also very grateful to those who made copies of unpublished or "in process" work available to us.

Since this book is primarily derivative, we are summarizing the work of colleagues from a perspective that may differ from their own. One must be selective in such an endeavor, to summarize, and to leave out much of interest. To do so is to commit an act of hubris, for who can really know

what is important? Inevitably, we have made errors in the process. We ask our colleagues to forgive our arrogance and to let us know about our errors.

Although there are no previous syntheses of Northwest Coast prehistory, there are some clear antecedents. C. E. Borden, the "father" of modern archaeology in British Columbia, always thought of the Northwest Coast as a whole, and his work from the late 1940s to the mid-1970s is the foundation on which others built. Frederica de Laguna's extensive investigations and publications of research on the north Northwest Coast solidly anchored subsequent research there. Although not a monograph and limited to British Columbia, Knut Fladmark's very long and detailed article in the *Canadian Journal of Archaeology* (1982) is a very important antecedent, and Matson used it extensively as a text in classes on Northwest Coast archaeology. Donald Mitchell's revision and publication of his Ph.D. research at the Montague Harbour site in southwestern British Columbia (Mitchell, 1971b) set an important standard for a regional synthesis and is a guide for archaeological description that has been followed by many others, ourselves included.

In writing this book, we are particularly grateful to those who took the time to comment on early versions of the manuscript. We thank Roy Carlson, Dale Croes, Donald Mitchell, Madonna Moss, and Douglas Brown, who read early versions and made numerous comments and suggestions on all aspects. Although we did not follow every suggestion, we did incorporate many, and this book is much improved thanks to their efforts. Kathryn Bernick and Margaret Holm provided important information and feedback on their respective specialties of interpreting water-logged artifacts and prehistoric art objects and allowed us to use some of their illustrations in this work.

Others have made important contributions to our work on the Northwest Coast in addition to their research contributions cited in this volume. Dr. George MacDonald, Director of the Canadian Museum of Civilization, generously supported Gary Coupland's dissertation research in the early 1980s on the Skeena River in northern British Columbia. Kenneth Ames had aided us many times in a number of different ways, as has Robert Ackerman. Likewise, David Burley has contributed more than research to help this volume come to fruition. Additionally, Gay Frederick's importance to this book lies far beyond her citations in the references. Alan MacMillan and Philip Hobler have helped us in many ways over the years. Tom Roll and John Draper, two individuals with whom we have not been in personal contact, also aided in the production of this volume because of the synthetic nature of their respective dissertations.

Others have also assisted us in less direct ways, chief among whom is Brian Hayden. David Aberle, Michael Kew, and Wayne Suttles have provided important feedback and information to us over the years. Ricky Lightfoot and Neil Guppy have also aided us. Former students, including

Gregory Monks, Leonard Ham, and Sheryl Stiefel, have also aided in our understanding the nature of the past on the Northwest Coast. Many other students over the past twenty years have also had their impact. The perspective presented here was first developed by discussions between John Wood and R. G. Matson more than twenty years ago.

Richard Pearson has long encouraged Matson to write a book of this kind and supported his various research endeavors. Suzy Matson not only read and commented on many different drafts but provided many of the illustrations.

Our research—and that of other archaeologists—could not have occurred without the participation of Northwest Coast peoples. We are thankful for their permission and aid in these endeavors and salute the achievements of their ancestors.

To all of these people, we extend our thanks.

R. G. Matson
Gary Coupland

This page intentionally left blank

1

The Evolution of Cultural Complexity on the Northwest Coast

***

INTRODUCTION TO THE PROBLEM

The development of the Northwest Coast ethnographic pattern—those uniquely complex ethnographic hunting-and-gathering societies—has been the focus of many archaeological investigations on the Northwest Coast of North America. We believe that the evolution of complex societies based on hunting and gathering and the concomitant origin of human inequity are the outstanding issues that unite Northwest Coast archaeology and transcend the boundaries of the Northwest Coast culture area. What we mean by these terms, and how the ethnographic Northwest Coast cultures contrast with most other nonagricultural people are delineated below.

The Northwest Coast culture area has been variously defined over the last 100 years and is usually thought to extend from the northern California

coast to Yakutat Bay at the north end of the Alaskan Panhandle, as is discussed in Chapter 2. This coastal strip is known for its wet but relatively mild climate, thick forests, numerous coastal resources, and abundant salmon. The aboriginal way of life associated with the coast extends well inland along the major salmon streams, the Columbia, the Fraser, the Skeena, and the Nass rivers.

The major cultural groups usually included in the Northwest Coast culture area (Figure 1-1) and their traditional anthropological names are, beginning from the south: the Tolowa from Northern California; the lesser known Pacific Athapaskan groups along the Oregon coast; the Chinook along the lower Columbia River area; the Coast Salish of the inland Puget Sound–Gulf of Georgia areas, as well as the lower Fraser River; the Nootka, most of whom now call themselves Nuu-chah-nulth, on the Pacific coast of Vancouver Island; the well-known Kwakiutl immediately to the north; the Haida of the Queen Charlotte Islands; and Tsimshian groups on the mainland coast opposite and extending inland up the Skeena and Nass rivers; and finally, furthest north, the Tlingit, occupying the Panhandle in southeastern Alaska. Many of the current members of these groups, such as the Nootka, are choosing to refer to themselves by names other than those given to them by anthropologists. This is, though, an evolving situation, and we have chosen for clarity to use the traditional anthropological names.

The archaeology of this area encompasses remains from 10,000 years ago to historic dwellings. Given our focus on the development of cultural complexity, we have chosen to subdivide this broad topic first by economic adaptation, and each adaptive stage, by geographical section of the coast. Most adaptations or evolutionary stages occur at approximately the same time up and down the coast, resulting in broad temporal periods.

Our orientation toward the prehistory of the Northwest Coast is justified by the distinctiveness of the cultural inhabitants at contact times and the clear dependency of this distinctiveness on their economic adaptation. What follows is our introduction to the important aspects of Northwest Coast cultures at the time of the first European visits.

THE NORTHWEST COAST AT CONTACT

It is clear from all accounts that the Northwest Coast peoples made their living by hunting, fishing, and gathering the natural resources found along the shore, in the ocean, in the streams and rivers that emptied into the ocean, and to a lesser extent, on the plants and animals found on the adjacent land. The shores produced a wide variety of shellfish, fish, seaweed, shore birds, waterfowl, and some sea mammals. The sea yielded many varieties of fish, with flatfish and rockfish second only to the preeminent salmon, which in six species and numerous varieties occurred in the many

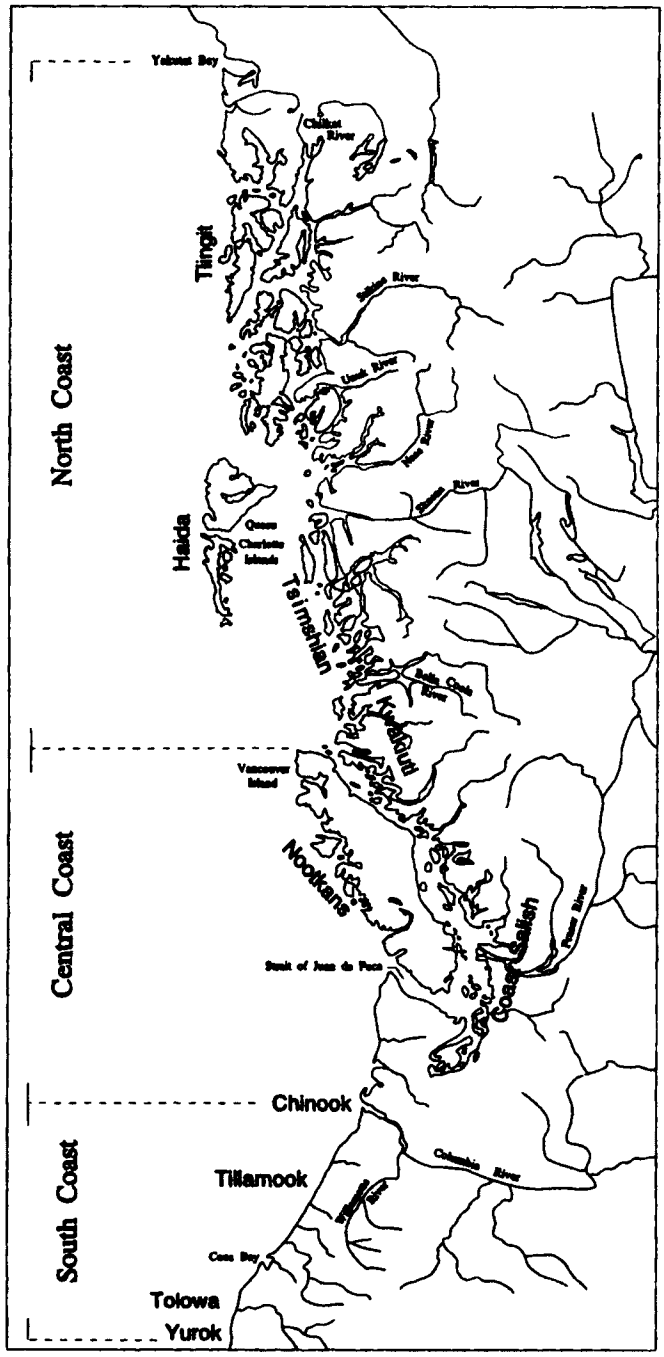


FIGURE 1-1 The Northwest Coast culture area. Approximate location of selected Northwest Coast groups.

streams and rivers as well as in the adjacent sea. More deep sea-dwelling or pelagic sea mammals were also available, and a few groups even sought out and captured whales. In contrast with the abundance of these resources, the deer, elk (wapiti), bear, and other land animals were minor constituents, although they were also exploited. Berries and fern roots were the most widespread of the utilized plants, but were of only minor caloric importance to most groups.

All these resources were not everywhere available, nor were many of them available long, or on a regular basis. In some cases they occurred regularly on a seasonal basis in certain locations, but in others neither the temporal occurrence nor the location could be predicted, making their use an uncertain proposition. In this respect the peoples of the Northwest Coast were like most other hunters and gatherers, in that they had to plan their lives in accord with the varying availability of resources. Besides tobacco, no other plant was regularly grown, and, except for the dog, no domesticated animal was kept. Thus, although abundant coastal resources were available, the Northwest Coast peoples were hunters and gatherers, sharing with other hunters and gatherers a way of life dependent on the vagaries of natural resources unaided by any significant amounts of domesticated plants and animals.

ETHNOGRAPHIC HUNTERS AND GATHERERS

Hunters and gatherers, as exemplified by such treatments as *Man the Hunter* (Lee and DeVore, 1968), are associated by anthropologists with a variety of expectations. These include demographic parameters, such as sparse density, usually less than 1 person per square mile (1 person per 3 sq. km), and small community sizes, which usually range from 25 to 50 people in the largest face-to-face group that regularly exists for more than a few weeks at a time (Martin, 1973). These small groups or bands are also seen to be highly mobile, not regularly staying in any place for any substantial length of time, and to consist of flexible groups that change from year to year. The mobile way of life meant that material possessions were usually either lightweight or easily produced. Except for hunters and gatherers in the high latitudes, gathering appears to usually provide most of the calories that, unlike stereotypes of old, are usually sufficient and obtained with relatively little labor. The archetypes of this way of life are the Australian Aborigines and the !Kung San as described by Lee (1979)—or the Great Basin Shoshone of Nevada and Utah described by Steward (1938). Although these may be extreme examples of this way of life, their characteristics are shared to some degree by most hunters and gatherers.

Along with these aspects of material life, we find many other shared social and economic characteristics. Each nuclear family is typically a self-

sufficient economic unit, making most, or all, of their material possessions, and producing their food by themselves from natural resources. Exceptions, such as Great Basin rabbit and antelope hunts (Steward, 1938) occur, but contribute only minor amounts of food, as did trade. The self-sufficiency of each family unit, where all families carry out the same activities, was paralleled by the division of labor, which must be limited to those categories existing in the typical family, those of age and sex. Thus, typically all adult men perform the same activities, as do all adult females. This precludes any but the most limited part-time specialists, although these did exist, such as shamans. Such individuals, though, do not make their living through their specialized activities.

Corresponding to the organization of economic life, status is almost exclusively achieved and usually related to productive activities. This kind of society, where status is achieved, and status positions not circumscribed in number—there are no necessary limits to the number of "good hunters" or "good basketmakers" in a society—is often referred to as an egalitarian society (Fried, 1967). Such status as one obtains in such a society is not constrained by the status one is born with, as all are born relatively equal. Clearly, though, someone born to a "good basketmaker" has a headstart towards achieving a similar status.

Without specialists or large communities, the amount of social complexity is necessarily low. Organized warfare is uncommon (Lenski and Lenski, 1985), self-reliance high, slavery absent or rare, as well as lack of significant permanent artistic and architectural achievements, and so forth.

Not all ethnographically described hunters and gatherers share in all these characteristics, but most do, to a high degree. Recently, archaeologists have found evidence that not all prehistoric hunters and gatherers fit this simple pattern (e.g., Price and Brown, 1985). The same data, though, indicates that all did until the last few thousand years. Just as our biological evolution has taken place in a hunting-and-gathering context, for at least tens of thousands of years—and more likely hundreds of thousands of years—our social and cultural evolution has also. This "hunting-and-gathering pattern" contrasts with our twentieth century way of life and with the Northwest Coast at contact times.

THE DEVELOPED NORTHWEST COAST PATTERN

From the first European contact to the advent of professional anthropological interest with Franz Boas, the Northwest Coast peoples have been recognized as unique among ethnographically described hunters and gatherers. The large, planked houses, grouped into what were often populous villages, attest to a degree of sedentariness and community size not usually seen outside of agricultural societies. Estimates of the total Northwest Coast

population have ranged from slightly more than 100,000 (Mooney, 1928) to about 200,000 (Boyd, 1990), very large numbers, given the relatively small land area occupied. The villages, repeatedly occupied by the same group for a number of months during the winter, would frequently include several hundred people, an order of magnitude larger than usually seen in hunting-and-gathering societies.

Differences in social scale and demography from other hunters and gatherers are also found in other social and technological realms. The standard household is not the nuclear family but an extended, multifamily household that usually numbers between 20 and 25 individuals, although there are exceptions, both on the larger and smaller ends of the scale. This household is the basic economic unit and usually occupies a single house, but is sometimes found within a single compartment or section within a yet larger house. Northwest Coast houses, always constructed of large split planks, and usually attached to a large timber frame, contain items of wealth and artistic complexity, from carved rattles to large, ornately decorated dance screens, carved wooden boxes and often, the house frames themselves. Large amounts of stored food are usually present, hanging from the house frame, in the wooden boxes, and in baskets.

The status and political system, likewise, differs radically from the common hunting-and-gathering pattern, where ownership of resources and ascribed statuses are unusual. The senior member of each household kin group usually controls most of the resources of his group, and most important resources in an area might well be "owned" by someone or some kin group. As discussed in more detail in Chapter 2, the individuals within a household could usually be classified into three groups; those closely related to the "chief" and who also had rights to resources and ceremonies, known as the "nobles"; those who were freeborn but had no such rights, known as the "commoners"; and slaves, owned by leading nobles or the household. According to Suttles and Jonaitis (1990) until the 1930s the Northwest Coast cultures were usually conceived of as consisting of these three "classes": nobles, commoners, and slaves.

We will refer to this Northwest Coast social and economic system as the Developed Northwest Coast Pattern. It differs radically from the egalitarian model common among ethnographic hunter and gatherers. There are at least three ascribed classes, with little possibility for mobility between classes. The ownership or control of many—if not most—important resources, the existence of the multifamily household unit, and large, permanent, although not necessarily continuously occupied, villages based on large-scale storage, are essential components of the Developed Northwest Coast Pattern.

These status differences within a community were not trivial, nor did they occur only in unusual situations on the Northwest Coast. Mitchell and

Donald (1985) and Donald (1983, 1990) present evidence that up to 25%—and more—of some Northwest Coast societies were slaves in early historic times. In some societies, such as the Kwakiutl, the "nobles" within a village were also "ranked" from most to least important according to a combination of their ascribed status and lifetime achievements. In the sidebar we see how an important Nootka "chief" and his house appeared to a European at the end of the eighteenth century.

An officer of the Chatham, one of Vancouver's ships wrote:

> About this time a party was made, of which I was one, to pay a visit to Maquinna the King of the Sound at his Village at Tashees, about 15 miles up the sound. . . . Maquinna received us with all the welcome and Hospitality of a Prince and seem'd much pleased with the honor done him. On entering his house we were conducted up to the end of it where there were seats placed in a long range covered with clean matts. His wives (for he had no less than four) & his children all clean dressed were seated near this end of the house ready to receive us and along the sides within the house were ranged crowds of his subjects. Maquinna had prepared an entertainment for us which was to be exhibited after Dinner, in the meantime the two Captains made the Royal family some handsome presents consisting of Copper, Blue Cloth, Blankets &c.
>
> The frame of Maquinna's house was amazingly large but only the habitable part of it was roof'd, this part was thirty yards long and eighteen broad. The roof was about 10 or 12 feet distant from the ground, and composed of large planks of Fir the ends of which were laid on Beams and moveable at pleasure. But the size of the Beams and their supporters was what raised in us more surprise and astonishment from the labour they must have cost in placing them in their present situation than any thing else we saw among them. In his house were three of these Beams that run along the whole house, one along each side and the other in the middle. They were of an equal length and thickness. We measur'd one of them and the dimensions were, in length, sixteenth fathoms (or 32 feet) [32 yards?] and in circumference twelve feet. They were supported at each extremity by Trees of much the same size on which were carved figures resembling (from the formation of the features) human figures but so large and so horribly preposterous that they were frightful to appearance. The Beams were solid Tree without a Knot in them and varied very little in thickness at either end. At one end of this house were piles of Boxes and Chests containing their Property and about a foot from the ground was a kind of Platform raised for the purpose of sleeping on & sitting on. It ran along one side of the house and across the ends and was about a yard wide. (Meany, 1915:20–21)

Maquinna is the chief who later captured the ship *Boston*, and kept two sailors as slaves. This event resulted in one of the first detailed, if somewhat garbled, accounts of Northwest Coast ethnography (Jewitt, 1975).

Clearly, such a society is a complex one, with far more specialization than the age and sex division of labor typical of hunters and gatherers. In fact, we know that historically individuals were famous as artists and hired by "chiefs" to produce high-status items such as carved wooden objects. These

specialists, however, did not engage in such activities on a full-time basis. The extreme case of economic complexity and specialization on the Northwest Coast may be the reef-net fishery of the Coast Salish (Suttles, 1951), which could have involved several dozen adults, a number of specialists, but not necessarily the reef-net location owner! This "fishery" is briefly described in Chapter 2.

Although the Northwest Coast divergence from the standard ethnographic hunting-and-gathering pattern is not complete—most Northwest Coast people in fact did move around in a seasonal pattern, and true full-time specialists do appear to be lacking—it does differ in most aspects. Furthermore, there are many other aspects not discussed above, such as warfare, that also vary from the usual hunting-and-gathering pattern. There is no doubt that the Northwest Coast had definite ascribed social inequality, in distinct contrast to the egalitarian pattern expected of hunters and gatherers.

Yet this pattern clearly did not originate with the first inhabitants. The Clovis hunters of 11,500 years ago, evidence of whom is found within 100 miles of the coast (Mehringer and Foit, 1990), and who gave rise to later Northwest Coast peoples, do fit the usual hunting-and-gathering pattern. For at least 8000 years, the Clovis descendant cultures on the Northwest Coast also lacked the large houses, elaborate art, and dense population seen at contact times. Thus, the Northwest Coast pattern is something that developed after the original settlement of the coast.

It is this development that is the focus of this work. We note that the development of cultural complexity on an agricultural base occurred many thousands of years ago in Southwest Asia in situations of which we have little ethnographic understanding, as we do not have firsthand observations of the first complex neolithic cultures. On the Northwest Coast, on the other hand, we have rich ethnographic accounts of the functioning societies, and so are able to contrast the archaeology and ethnography, a most fruitful approach. Hayden (1990) and Henry (1989) suggest complex societies developed before agriculture, and the development of this pattern may be a necessary prerequisite for the development of agriculture. Henry (1989), in particular, compares the preagricultural Natufian in the Levant with the Northwest Coast ethnographic pattern.

In sum, the development of the Northwest Coast Pattern should give us insight on the origins of human inequity and social complexity, and perhaps to the development of agriculture. Because human inequity today is so closely linked to agriculturally based societies, its development is difficult to separate from that of agriculture (Lenski and Lenski, 1985). The Northwest Coast demonstrates that agriculture is not a necessary prerequisite for inequity, and some features common to both the Northwest Coast and agriculture must be responsible for inequity—or that there are a number of

different settings in which social inequity and cultural complexity may develop. The importance of the questions of the origin of cultural complexity and agriculture give the prehistory of the Northwest Coast a relevance beyond regional culture history.

Although this work is focused around the origins of cultural complexity and human inequity, the sequence of the evolutionary stages are broadly coeval with the traditional culture history framework (i.e., the sequence of the archaeological cultures as classified by the imperishable remains of past activities).

SYNOPSIS

We begin by reviewing the range of variation found in the ethnographic Northwest Coast as well as the commonalities. In Chapter 2 we focus on the history of the definition of the Northwest Coast Culture area and examine the ethnographic similarities and differences. Chapter 3 reviews the history of archaeological research and explains how the important cultural historical framework of regional sequences was developed. Chapter 4, describing the initial occupation of the Northwest Coast, begins by reviewing the peopling of the New World. The first known occupation of the coast began more than 8000 years ago and this adaptive stage lasted more than 3000 years without the coastal cultures showing clear artifactual differences from their inland neighbors, although separate northern and southern cultures are found.

In Chapter 5 the emergence of distinctive coastal cultures stage is described. This period lasts from around 5000 to perhaps 3000 years ago north of the Columbia River, and in most places shows a definite specialized adaptation to the coastal environment, and clear differences from neighboring inland cultures.

The third adaptational stage, the subject of Chapter 6, is clearly one of more specialized and intensified adaptation than previously, and one in which development of "cultural complexity" may have occurred. Here we review in detail different theories for the origins of cultural complexity and human inequity. These models are also referenced in the following chapters.

Chapter 7 is a synthesis of the cultures with the first clear evidence for sociocultural complexity. We include such well-known cultural material as the Marpole phase. At the end of this chapter we review the status of some of the models for the evolution of cultural complexity introduced previously.

The last period, which we have labeled continuity of cultural complexity, is the subject of Chapter 8. This period includes most of the last 1500 years

of coastal prehistory, which appears to differ little from the pattern seen by ethnographers.

In Chapter 9 we briefly highlight some of the major commonalities and recapitulate what we have discovered. We end by focusing on outstanding questions and how these might be answered through further research.

2

The Northwest Coast Culture Area

***

INTRODUCTION

Because this book focuses on the evolution of the Developed Northwest Coast Pattern, an abstraction based on the ethnographic cultures, we need to describe exactly the extent, commonalities, and the variation within this culture area. We begin with a brief review of the definition and description of this culture area by Wissler, Kroeber, and Drucker, and then look at the very different procedures used by Jorgensen (1980) to arrive at a similar classification. After this discussion, we review the commonalities and variability that make up the Developed Northwest Coast Pattern. This description serves as the object of comparison with the archaeological developments that are our main subject.

TRADITIONAL DEFINITIONS OF THE NORTHWEST CULTURE AREA

Wissler (1914, 1917) was the first to describe the Northwest Coast Area in modern terms. Although Suttles (1990a) and Kroeber (1939) point out that workers such as Mason (1896, 1907) and Boas (1897) had either developed antecedents of the culture area system or indicated awareness of the similarity of cultures along the north Pacific coast, F. Clark Wissler (1914, 1917) was the first anthropologist to define the notion of culture area and the first to systematically describe what made up this particular culture area, as well as others from the New World. As more recent definitions follow Wissler's, we will review his formulation in some detail, and then consider later versions mainly in how they differ from this groundbreaking effort.

Wissler's original article (1914) outlined culture areas of North American Indians based on material culture and acknowledged the prior contributions of Mason. It was shortly followed by a monograph treatment of the entire New World using the same methodology (Wissler, 1917). For our purposes, we will use the third edition of the monograph (Wissler, 1938) as containing Wissler's view corrected according to the latest ethnographic information he had available.

Wissler's scheme actually has two parts: the definition of food areas and the subdivision of food areas into culture areas. Wissler argues that food areas have two characteristics that are useful for the classification of cultures. First, "The almost universal tendency among the several groups of mankind is to specialize in some one kind of food which thereby becomes the staple, or main support, to be supplemented by secondary foods when opportunity permits" (Wissler, 1938:1). The second "characteristic is that this specialization is uniformly distributed over a considerable area" (Wissler, 1938:1). Wissler finds eight of these food areas in the New World, with the "Salmon Area" including the Pacific Coast from the Gulf of Alaska to San Francisco, inland to Idaho. This area incorporates all people who used salmon extensively, and includes all of the Northwest Coast, the Plateau, and parts of the California culture areas.

After reviewing a broad range of individual culture traits (which make up the bulk of the book), Wissler argues that the New World cultures can be grouped into 15 classes, which are mainly subdivisions of the earlier eight food areas. The fourth (Area 4) of these cultures areas is the North Pacific Coast Area which is described as "ranging northward from California to the Alaskan peninsula" (Wissler, 1938:229). He sees three subdivisions within this area: a northern group, that of the Tlingit, Haida, and Tsimshian; a central group of Kwakiutl and Bella Coola; and then all those to the south. He is not very clear how far south this area extends, although he does include Athapaskan groups on the southern Oregon coast (Wissler, 1938:229).

In his description of the California area he discusses "intermediate groups."

> In northern California are again the Karok, Yurok, Wishosk, Shasta and Hupa and other Athapascan tribes; here sea food on the coast and salmon in the interior rival acorns and other foods; dug-out canoes; rectangular gabled houses of planks with circular doors; basketry almost exclusively twined; elkhorn and wooden trinket boxes; elkhorn spoons; stone work superior to that of central California; the occasional use of rod, slat, and elkskin armor and also basket hats of the northern type. These all suggest the culture further north (Area 4), as do the appearance of carving and the more elaborate decorative art. Also, social organization becomes more definite, with clear-cut property distinctions, mourning ceremonies, and the secret initiations are wanting; and the use of stuffed albino deerskins in certain ceremonies is distinctive. Even the mythology is said to have leanings toward that of the north and east. (Wissler, 1938:228–229)

Wissler, then, places these northern California groups into an intermediate classification, between Northwest Coast and Californian. His concern with the distribution of material traits, second only to the main foods, is well illustrated here.

Although Wissler emphasizes the material traits of each culture area, he does see his north Pacific coast area having "society organized as chiefs, nobles, common people, and slaves" (Wissler, 1938:230). He also notes the potlatch, and "the great dependence on sea food. . . . dried fish, clams and berries are the staple food" (Wissler, 1938:229). Finally, he comments that "the art, social, and ceremonial traits of the north all thin out as we move southward" (Wissler, 1938:231).

Although expressed differently than we would today, we note that for him the economic basis of this culture area is seafood, mainly stored salmon, with other dried fish, clams, and berries also being important. Furthermore, these societies were organized around ascribed social status—nobles, common people, and slaves, at least—and many shared the famous potlatch, elaborate art, ritual, and material arts commonly associated with the Northwest Coast. Most of these traits "thin out" towards the south, leaving the groups in northern California in an "intermediate" class. Thus, the main traits that today define this culture area, as well as the intermediate nature of the southern end, were recognized by Wissler.

For all these achievements, the methods used by Wissler are unclear, and explicit criteria nonexistent. It is a very sketchy portrait, however correct it is in such details as presented. Kroeber, building on this foundation, presents a more detailed picture and a more explicit presentation.

Kroeber's first work dealing with the Northwest Coast and its characteristics was in 1923 (Kroeber, 1923), but is superseded in most ways by his extensive monograph (Kroeber, 1939) on North American culture areas. Kroeber's monograph was actually completed in 1931 (Heizer, 1963), and improved on Wissler's in at least two important ways: (1) a more detailed

comparison of culture areas and environment, and (2) a focus on culture areas, rather than individual material traits, which made up the bulk of Wissler's work. The Northwest Coast culture area is given that name and is said to be essentially the same as Wissler's north Pacific coast.

Kroeber's definition differs from Wissler's in the treatment of the Willamette Valley and northern California. The Willamette Valley in northern Oregon is included within the Northwest Coast area, although "it is the only interior culture in the Northwest region, and is probably best construed as an inland modification of a form of the primitive river phase" (Kroeber, 1939:30). Kroeber also includes a number of Northern California groups: the Yurok, Karok, and Hupa in the Northwest Coast. Although these groups have lower levels of cultural complexity, Kroeber shows that they have some of the highest population densities anywhere along the Northwest Coast (Kroeber, 1939:142).

Kroeber demonstrates that the Northwest Coast has a population density second only to California within North American cultures areas—28.30 people per 100 sq. km. This figure is based on an occupied area of 456,000 sq. km. A density of 28.30 is more than twice that given for any other culture area outside of California. If we use the higher population figures (200,000) cited in our first chapter (Boyd, 1990), we would obtain a density of over 50 people per 100 sq. km. The same modern revisionism that results in almost double the population for the Northwest Coast that Kroeber, following Mooney (1928), allowed, results in doubling most other culture areas, so that the relative density of the Northwest Coast population in comparison to other culture areas remains the same.

Within the Northwest Coast area, Kroeber several times points to the fact that the population density is greater in the south, whether calculated by unit area or coast line (Kroeber, 1939:169), in apparent contrast to the greater complexity found in the north. Kroeber sees the Northwest Coast as being "originally a river or river-mouth culture, later a beach culture, and only finally and in part a seagoing one" (Kroeber, 1939:28). He views the southern part as representative of an earlier stage of the development of the Northwest Coast.

We will demonstrate later that this perspective was shared by early archaeologists and is still found today in Northwest Coast archaeology. Kroeber also saw the Northwest Coast as being influenced by traits from Asia, which he thought included rod armor, hats, carving, masks, and the emphasis on wealth.

With regard to vegetation, Kroeber states that

> The Northwest Coast culture tallies almost perfectly with the Northwestern Hygrophytic Forest.
>
> Within this, the area appearing most aberrant culturally, the Willamette Valley, is also aberrant phytogeographically, being classed as forest by some authorities, as grassland by others (Kroeber, 1939:206)

With Kroeber we have the conventional culture area fully defined, its subareas well delineated, and comparison with other cultures spelled out. Two intermediate areas, the Willamette Valley and Northwestern California, are placed within the culture area, but their peripheral nature is noted. It is the Kroeberian definition that Drucker, the main presenter of the Northwest Coast to outsiders, follows (Drucker, 1955, 1965). Drucker does not, however, discuss the inhabitants of the Willamette Valley. The second half of this chapter can be seen as our attempt to provide an updated summary of Drucker.

Before we turn to this, though, the sidebar provides a summary of Jorgensen's attempt to develop a systematic, nonimpressionistic classification of the same native groups, and some alternatives to the conventionally defined culture area. The methodology used by Jorgensen is very similar to that followed by a number of Northwest Coast archaeologists, and this methodology will be referred to a number of times later in this book.

Jorgensen was a student of Driver (Jorgensen, 1974), who in turn was a student of Kroeber. While a graduate student, Driver had worked on developing a more systematic and quantitative means of looking at culture area. Jorgensen further developed Driver's approach and used a total of 292 variables with 1577 attributes to compare 172 western North American "Tribes" (Jorgensen, 1980). This vast amount of data was reduced by cluster analyses and multidimensional scaling of Driver's G matrices of differences between the 172 tribes. The first step in this methodology results in a matrix of pair-wise distances between the 172 tribes. This matrix of distances is clustered, resulting in tree diagrams or dendrograms, where the ends are the tribes (Figures 2-1, 2-2) in this case. The same distance matrix can be multidimensionally scaled, resulting in two-dimensional plots with symbols indicating the positions of the tribes on dimensions or factors. These fundamental steps occur in all applications of this type of analysis. The relationships among Northwest Coast groups and their neighbors, as discovered by Jorgensen, are seen in the dendrograms reprinted here (Figures 2-1, 2-2).

Jorgensen produced analyses of all 292 variables, which measured the overall cultural similarity among the tribes, and subsets of the variables concerned with cultural aspects such as "Economic organization" (67 variables), "subsistence economies" (30 variables), "social organization" (51 variables) and so forth. Given the emphasis by both Wissler and Kroeber on overall similarity and on the importance of the type of subsistence economies, it is these two analyses that should be the most critical for our purposes.

Figure (2-1) is a reproduction of a part of Jorgensen's Figure 4.3, an average linkage variant cluster analysis using all 292 variables. In a cluster analysis, the items located at the ends of the diagram and linked together at the smallest distances are the most closely related. Note that all the members of the Figure 2-1 cluster are located on the Northwest Coast, between the Tlingit on the north and the Tolowa in northern California.

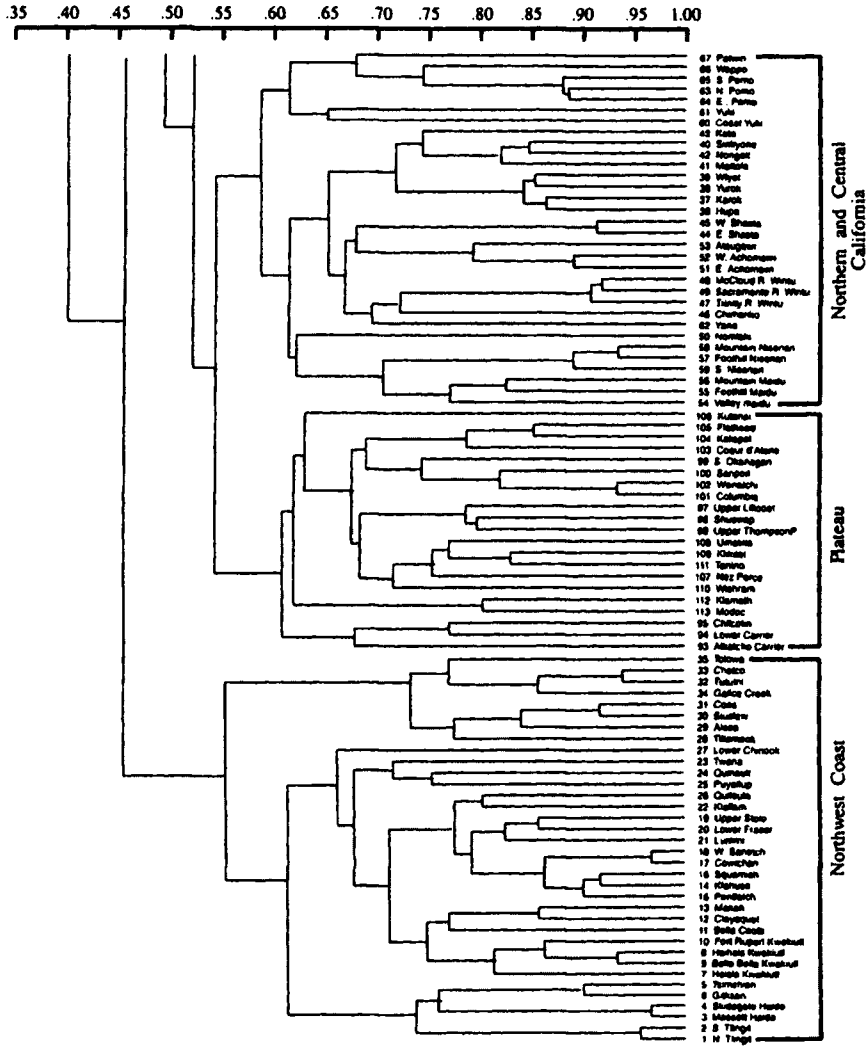


FIGURE 2-1 Jorgensen dendrogram of overall similarity. Using all 292 variables. (From Jorgensen 1980, Fig. 4.3).

No groups that are located geographically between the two are found in other clusters. This cluster analysis, then, confirms the Northwest Coast culture area as defined by Wissler and Kroeber. Jorgensen did not use any groups from the Willamette Valley, but did include the Karok, Yurok, Wiyot, and Hupa. These possible members of the Northwest Coast culture area are found clustered with other northern and central California groups, suggesting that they belong best with the California culture area.

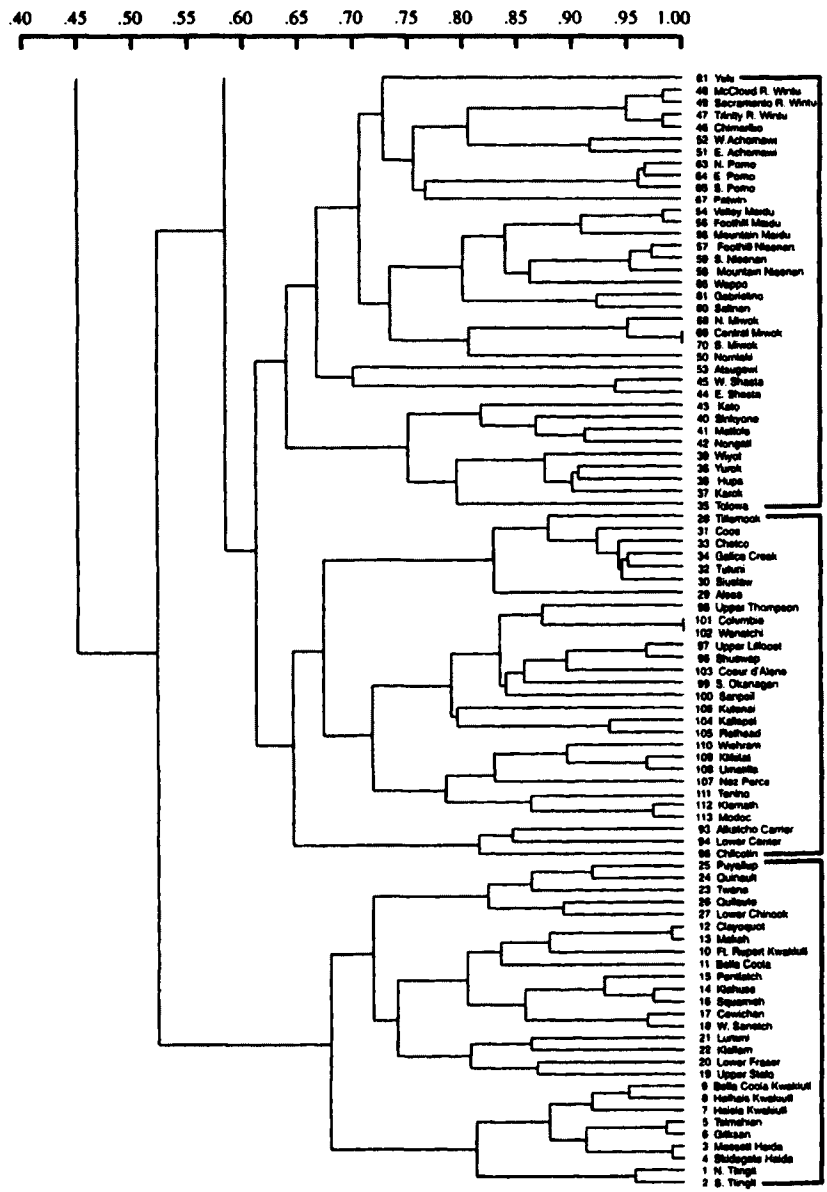


FIGURE 2-2 Economic similarity among western Indians. (From Jorgensen, 1980, Fig. 7.1).

Within Jorgensen's Northwest Coast Cluster (Figure 2-1), the groups south of the Chinook (Tillamook to Tolowa) are a separate subcluster, confirming the subdivision seen by others within the Northwest Coast. Similarly, the Tlingit–Tsimshian cluster in the north is relatively separate from the rest of the Northwest Coast, a subdivision also seen by Wissler, although he also saw a central group of the Bella Coola and Kwakiutl.

Turning to subsistence economy analysis (not illustrated), all of the Northwest Coast groups between the Tolowa and Tlingit, except for the Tolowa, are found in the same cluster, Group 5, although a number of Plateau groups are also found there, as well at the putative Northwest Coast Wiyot (northern California). The Tolowa are found in another group that also includes the northern Californian Yurok, Karok, and Hupa. This analysis supports the previous one, emphasizing the cluster from Tlingit to Tolowa, and again putting the other California groups (except for the Wiyot) outside.

In Jorgensen's Economic Organization analysis, Northwest Coast groups from Tlingit to Chinook are found in the same cluster (Group 9 on Figure 2-2). Groups south of the Columbia, down to the Tolowa, but not including them, are found in Group 8, which consists of mainly Plateau culture area groups. The Tolowa are found in a California cluster, but only weakly linked to other northern Californian groups.

Jorgensen's analysis supports the general conclusions of judgmental analyses by Wissler and Kroeber, and can be seen as indicating that the Californian groups of Yurok, Karok, Hupa, and Wiyot are not definite members of the Northwest Coast culture area (Figure 2-1). We choose to interpret them in that light, and for the purposes of this work we will use the Tolowa as the southern limit of the Northwest Coast culture area. Given the limited information on groups from the Willamette Valley, we will not consider this area as part of the Northwest Coast either, although we recognize that both these regions have many similarities with their Northwest Coast neighbors.

Both the traditional and Jorgensen's definitions of culture areas have been criticized. The traditional approaches used by Wissler and Kroeber are heavily based on material items and the relevance of this to the "essence" of Northwest Coast culture has been questioned. In addition, the highly judgmental procedures followed by Wissler and Kroeber make it difficult to evaluate or reproduce their findings.

Wissler, however, clearly oriented his 1917 treatment around food areas. In the widely followed cultural ecology perspective developed by Julian Steward (1955), the cultural core is seen as those aspects involved in subsistence and economy. These are seen as "determining" or "limiting" (Ellen, 1982) many other aspects of culture. Thus Wissler's orientation is justified by the *post facto* development of cultural ecology, which has been validated

in many situations. In this view—which is repeated many times in many different ways by different authors cited in this volume—those "other" aspects of Northwest Coast culture, including complex society, complex art, and large houses, are dependent on the economic organization and not independent phenomena. Furthermore, the alternative perspective of viewing the "essence" of the Northwest Coast—the competition for prestige, the concern with art, nonmaterial aspects of culture—as the proper focus for culture area investigations or for this work has very serious drawbacks. This "essentialism" view has been shown to be inadequate for dealing with evolving phenomena (Ghiselin, 1969:50–56), for how can the "essence" change, or come into being?

There is no doubt, though, that the actual procedures used by Kroeber and Wissler are not explicit and were dependent as much on tradition and personal judgment as any objective method. Jorgensen's procedures are explicit and reproducible. His monumental work, on the other hand, can be criticized—and to some extent has been (M. Smith, 1981; Cohen, 1982)—on choice of variables, idiosyncratic division of "tribes," and errors in coding and in the quantitative procedures used. It is more reproducible in principle than in fact, at least on the published information. The exact quantitative methods used do not appear to be optimal today. In any work of such magnitude, errors in coding will occur, and errors in ethnography will be repeated. Random errors, however, are usually seen as blurring patterns rather than producing false results. In this light, Jorgensen's results appear to be wonderfully clear in the Northwest Coast case, indicating that the errors are not significant overall.

Given that culture area research is not a major topic in anthropology today, the close correspondence between the modern and traditional approaches is as good as one could wish for. It does not appear that the critiques have much consequences for the definition of the Northwest Coast culture area as used here. There is, though, a poorly justified alternative definition that has seen some use.

The difference between the Northwest Coast north of the Columbia River and that of the south, noted by Wissler (1938), has led some to consider only the cultures north of the Columbia as belonging to the Northwest Coast. Mitchell and Donald (1988:294) in an otherwise excellent treatment of Northwest Coast economies, define the Northwest Coast as including "all those groups who inhabited the north Pacific coast of North America from the vicinity of Yakutat Bay in southeast Alaska to the lower reaches of the Columbia River." They indicate that the Northwest Coast is bounded in the south by the "Oregon coast–California" culture area. They give no justification for such a definition, but we can easily supply one for them—the previously known break at the Columbia River, and the lesser known information of the southern groups versus those north of the Columbia

River. Mitchell and Donald, moreover, are not the only ones to consider the Northwest Coast in such terms.

Let us consider the results of such a division. This would indicate the traditional view of the Northwest Coast was in error, and that the Oregon coast groups are more closely related to the California groups than the Northwest Coast. But can this be so? Wissler has the Californian groups belonging to the "wild seed" food area, with the acorn being the most important seed. Kroeber would include the Hupa, Wiyot, Karok, and Yurok with the Northwest Coast, but not the rest. Jorgensen's work shows the Oregon coast groups are overall clearly part of the Northwest Coast (Figure 2-1). In his more specialized subsidiary analyses these groups do not always join with the other Northwest Coast groups, but do not necessarily cluster with Californian groups either. In subsistence economies, as reviewed in the sidebar, most of these groups are found in cluster 5, along with most Northwest Coast groups and many Plateau groups. Most Californian groups are found in clusters 6 and 7 (Jorgensen, 1980:120). In economic organization, the Oregon Coast cultures form a separate subcluster joined with Plateau groups (Jorgensen, 1980:132). In social organization, they link with about two-thirds of the Northwest Coast groups (1980:158–159) (The Northern Haida, Tlingit, Tsimshian, and one Kwakiutl group form their own cluster). In terms of political organization (1980:212–213), the Oregon coast groups form their own cluster. Thus there is no indication that they are closely linked to the California culture area. If the Oregon coast groups do not belong in the Northwest Coast, they must be considered to be their own separate culture area, the smallest in North American—although Jorgensen's analysis does not support this.

Any culture area can be thus sectioned by taking the regional subdivision most dissimilar from the other regional subdivisions and calling it a new culture area. It is clear that such a procedure is senseless unless there are enough significant features to justify it. In the current instance, we know of no one who has made such a case, and in fact, we can only differentiate by degree: the Oregon coast groups are not as "Northwest Coast" as the groups further north, but they are more similar to these groups than to any other, including Californian. Thus it is the amount of emphasis that appears to be wanting rather than a different orientation. For these reasons we see no justification for supporting a culture area dividing line at the Columbia River, although we do recognize—as all have following Kroeber (1939)—that the groups south of the Columbia do form a regional subgroup. In our treatment of the Northwest Coast culture area we will refer to that part south of the Columbia River as the south coast. We somewhat more arbitrarily divide the part north of the Columbia River into the Central Coast, which is the coast between the Columbia River and the north tip of Vancouver Island, and the North Coast, which is between the north tip of Vancouver Island and beyond north to Yakutat Bay.

SUMMARY OF COMMONALITIES AND DIFFERENCES

Environmental and Cultural Commonalities

Far from being entirely homogeneous, the Northwest Coast has always been seen as an area with commonalities and differences, both environmentally and culturally (Wissler, 1917; Kroeber, 1939; Suttles, 1962; Schalk, 1981). Environmental commonalities are seen on a broad scale. The climate, generally speaking, is moderate but not Mediterranean, lacking hot, dry summers typically found in adjacent inland areas. Winters from northern California to southeast Alaska are mild, particularly in comparison with the inland area, with high precipitation, mostly in the form of rain. Annual precipitation exceeds 1000 mm almost everywhere, even at the southern or "dry" end of the Northwest Coast.

The naturally occurring vegetation is what was earlier called *hygrophytic*, a coniferous forest, adapted to abundant rain and moderate temperatures. A Sitka spruce-Western hemlock forest is found along the coast from the California border to Yakutat Bay (Suttles, 1990b). Other firs, spruces, cedars, hemlocks, and redwoods are found in different areas along the coast. These trees provide the basic raw materials for the wood and fiber industries of the aboriginal Northwest Coast cultures.

The abundance of marine, foreshore, and anadromous faunal resources is another basic commonality of the Northwest Coast environment. The best known resource is Pacific salmon, six species (of the genus *Oncorhynchus*) of which run and spawn in the rivers and lakes of the Pacific Northwest from the Sacramento River north (see sidebar). An anadromous fish, salmon are born in freshwater, and spend from a few weeks (chum) to two years (some sockeye) in rivers and freshwater lakes. They then migrate to sea where they spend most of the remainder of their lives (Hart, 1973). In the final phase of their life cycle, Pacific salmon return to freshwater, where they run, spawn, and eventually die. Some salmon travel over 600 km up river systems, usually returning to the same stream and even to the same location in that stream where they hatched. The runs are seasonal and episodic, breeding populations returning to the rivers as a cohort. Depending on the species and race, the earliest runs occur in late spring, and the number of runs increase steadily in frequency, reaching a peak in late summer and early fall in most river systems. By late fall, most runs are over, although chum may run into the new year. The life cycle of salmon, especially the run phase, makes it an extremely predictable resource for the human consumer.

A variety of other marine and intertidal resources are available along the coast (see sidebar). Important marine fish include halibut and other flatfish, Pacific cod, Pacific herring, various rockfish (*Sebastes* spp.), and the famous candlefish or eulachon, which is most abundant on the central and

north coasts. Halibut can reach enormous sizes, in some cases up to 200 kg. Halibut may even be the most important resource on the Queen Charlotte Islands. Herring spawn close to shore in shallow water in dense schools in late winter. In ethnographic times they were an important subsistence resource along the central and north coast because few other resources were available at this time of year. Seals, both harbor and fur seal species, dolphins, whales, and both California and Steller sea lions, were all available. In the intertidal zone, various species of burrowing clams could be obtained in the intertidal flats at low tide, while mussels thrived on the rocky foreshores.

As early recognized by Wissler (1917), salmon was by far the most important of these resources. Baumhoff (1963) demonstrated that for northwest California, measures of salmon abundance alone could predict population sizes, which Sneed (1971) confirmed for the Fraser River drainage. Donald and Mitchell (1975) showed that within the Southern Kwakiutl, community size was highly correlated with salmon escapement counts. It is no accident that rivers with extensive salmon runs, such as the Columbia, Fraser, and Skeena, are the only places away from the coast that have Developed Northwest Coast Pattern cultures.

Important Northwest Coast Resources

Fish

Salmon, anadromous members of the Salmonidae family that live most of their life in the ocean but return to freshwater to spawn. All six species of Pacific salmon exist along the Northwest Coast.

Pink salmon (*Oncorhynchus gorbuscha*) (also known as humpbacked) spawns in September and October, usually close to saltwater; a small (1.5 to 2.5 kg) salmon with a two-year cycle; most abundant salmon in this area.

Chum salmon (*Oncorhynchus keta*) (also known as dog salmon) spawns late in the year and even early in the new year; usually spawns close to saltwater, but also goes well up rivers; a large salmon (weighs up to 15 kg) with a 3- to 5-year cycle. Low in fat, it is favored for preservation by natives (Hart, 1973:114).

Coho salmon (*Oncorhynchus kisutch*) spawns in October and November, usually in small streams; a medium-sized salmon (2.7–5.4 kg) with usually a two-year cycle.

Sockeye salmon (*Oncorhynchus nerka*) is a long-distance spawner, entering the larger rivers in late July, and spawning in interior rivers and lakes during August and September; a medium-sized salmon from 2–4 kg, with a clear 4-year cycle in the Fraser; most important commercial salmon today.

Chinook salmon (*Oncorhynchus tshawytscha*) (also known as spring, king, and tyee salmon) is the largest salmon, frequently over 15 kg, and even up to 50 kg, but usually between 4 and 22 kg; spawns over much of the year, but usually only in the larger rivers.

Halibut (*Hippoglossus stenolepis*) is a large right-eyed flatfish found more abundantly on the north coast; weighs to over 200 kg, found on soft bottoms; well-developed native fishery along central and north coasts.

Starry flounder (*Platichthys stellatus*) (also known as flounder, grinder, or grindstone because of rough skin) is a medium-sized flatfish, which spawns between February and April in shallow water on the central coast. Weighs up to 9 kg. Important archaeologically.

Pacific cod (*Gadus macrocephalus*) a deep-sea (benthic) fish, occasionally found in shallow water; up to 1 m in length; now obtained commercially by deep-sea trawlers; also found to be important archaeologically.

Eulachon (*Thaleichthys pacificus*) (also known as candlefish) is a small, anadromous, member of the smelt family (up to 23 cm), found throughout the Northwest Coast. It spawns from the middle of March to the middle of May in a few large rivers in British Columbia where it is most important. Important native fisheries existed both for food and for the abundant oil.

Surf smelt (*Hypomesus pretiosus*) is a small fish (up to 30 cm), which spawns in the surf on open, sandy beaches at high tides. Although found throughout the Northwest Coast, an important native food fishery was present only on the south coast, where nets were used to obtain large numbers during late summer spawning.

Rockfish (*Sebastes* spp.) A genus with many species (35 in British Columbia alone), having common characteristics of spines, large heads, and being found in relatively deep waters with rocky bottoms; important archaeologically.

Shellfish

Mussels are found on rocky foreshores in the upper intertidal zone. *Mytilus edulis*, the bay mussel, is found in protected waters, and *Mytilus californianus* is found on the outer coast and produces a larger shell that can be used for tools.

Barnacles (most *Balanus* spp.) are found on rocky foreshores, from the upper intertidal zones to 90 m below. Small acorn barnacles (*Balanus cariosus, B. crenatus, and B. glandula*) found on rocky foreshores in the middle and upper intertidal zones are not clearly used for food. Larger species (e.g., *B. nubilus, B. altissimus*, and *B. aquila*), usually found lower down, were used for food.

Littleneck clam (*Protothaca staminea*) is found in the upper intertidal layers, in clay and gravel in the upper 8 cm of the deposits.

Horse clam (*Tresus nuttallii* and *T. capax*) grows up to 20 cm in length, and lives 0.5 to 1.0 m below the surface in mudflats.

Butter clam (*Saxidomus giganteus*) is found in the lower one-third of the intertidal area in sandy or gravelly beaches.

Rock Cockle (*Clinocardium nuttallii*) is a shallow burrower in sand and mud beaches often associated with eel grass flats.

Whelks (*Nucella* [formally *Thais*] *lamellosa, N. canaliculata*) are often found among barnacles and mussels on rocky foreshores. Typically found in crevices at low-tide line.

Limpets (including *Fissurella volcano*) are found on rocks in the lower intertidal zone. Individuals range up to 10 cm in size.

Chitons (a variety of genera, but *Katharina* spp. and *Cryptochiton* spp. prevalent) found on rocks at low-tide line. Up to 33 cm in length.

Sea urchins (*Strongylocentrotus* spp.) found on rocks in mainly open coasts. Locally very abundant up and down the coast. Range in size from 80 to 127 mm in size.

Sea Mammals

Harbor seal (*Phoca vitulina*) ranges up to 1.5 m in length and up to 110 kg; a nonmigratory, earless seal, common along the coast, and on sand bars.

Fur seal (*Callorhinus ursinus*) males range up 1.8 m in length and up to 250 kg, females to 1.35 m and 60 kg. A pelagic eared seal, today found well off the coast, with the only known rookery in the Bering Sea. Archaeological evidence indicates rookeries were present in the past closer to the central Northwest Coast.

California sea lion (*Zalophus californianus*) males range up to 2.4 m in length and 250 kg, females to 1.8 m and 90 kg. A noisy, eared seal common along the south and central coasts, but more marine than the harbor seal and less so than the fur seal.

Steller sea lion (*Eumetopias jubatus*) males range up to 3 m and to 1000 kg, females to 2.1 m and 250 kg. A large, eared seal found off the coast all along the Northwest Coast.

Gray Whale (*Eschrichtius robustus*) ranges up to 14 m. These whales migrate yearly back and forth along the coast between Baja California and the Bering Sea. Whales were hunted by the Nootka on the west coast of Vancouver Island and related groups on the adjacent Olympic peninsula of Washington state. This species probably made up the majority of those obtained.

A number of cultural commonalities exist for the entire Northwest Coast area. All aboriginal people of the Northwest Coast relied on fishing, hunting, and gathering as a way of life with an emphasis on fishing. Dependence on other resources varied to some extent, but in general, aquatic resources (see sidebar) were more important than terrestrial resources even for groups such as the Gitksan (inland Tsimshian) and Stalo (Coast Salish) who lived inland along rivers. Because many marine resources, including fish and sea mammals, are migratory, and are only available to human consumers at certain times of the year, mass harvesting was common along with preservation and storage technologies.

Common features of traditional Northwest Coast technologies include an emphasis on bone and antler working, woodworking, and pecked and ground stone technology. The flaked stone industry was poorly developed in most areas, and ceramics were unknown. Metal objects, except those of native copper, were essentially absent before contact. Although the results are rarely preserved in the archaeological record, woodworking was the great achievement of Northwest Coast technology. Wood, primarily cedar

(and redwood in the south), was used for plank house construction, canoe building, monumental art, and containers. Plant fibers were used for clothing, weaving, and baskets.

One of the main features of the settlement pattern was the winter village, supported primarily by stored food from other seasons. Although usually not occupied year-round, winter villages were permanent places used by the same group of people year after year. Size varied, but even the smallest villages typically numbered over 100 people.

Organization within winter villages was also fairly consistent. Each village included a number of separate dwellings. House styles varied in detail from region to region, but plank construction was used everywhere. Dwellings were typically large, and everywhere they accommodated households larger than the nuclear family. The household was nominally a kin group, and was the basic unit of production. Thus, the domestic unit was larger than the nuclear family. Mitchell and Donald (1988) suggest an average size of four to six families per household for groups north of the Columbia River, a figure that correlates well with the number of 25 individuals per household often referred to by others and not out of line with the estimate of 18.2 reported by Blackman (1973).

Hereditary social inequality is an essential feature of Northwest Coast social organization, as recognized by Wissler. In recent times, the people of the Northwest Coast have usually been thought to provide classic examples of rank societies (Fried, 1967), in which there were fewer formal positions of social status than there were people to fill them. In a rank society, potential candidates are limited by heredity. The variability in status is seen to occur within kinship groups but not between them, so that the formation of social classes that are composed of entire kin groups is prevented (Figure 2-3). In Fried's view, the Northwest Coast is an example of a rank society where, however important the status distinctions are, access to the basic necessities of life are available to all. Recent studies, though, have questioned the validity of this view of the Northwest Coast.

A number of investigators have argued that class distinctions as well as rank existed on the Northwest Coast (Ruyle, 1973; Donald, 1985; Mitchell and Donald, 1985; Suttles, 1990a). In a class society, or as Fried (1967) terms it, a stratified society, status differences exist between kin groups and not everyone has equal access to the necessities of life. By definition, differences in status between kin groups means that status differences are hereditary or ascribed. Thus, in stratified society, as in contrast to a rank society, the ascribed statuses present not only determine the amount of access to the necessities of life, but are also inequitably distributed among kin-based social units.

As a side note, we should indicate that the following presentation of the Northwest Coast culture descends from the positions first put forward by Suttles (1951, 1960, 1962, 1968, 1987, 1991), and owes a great deal to the

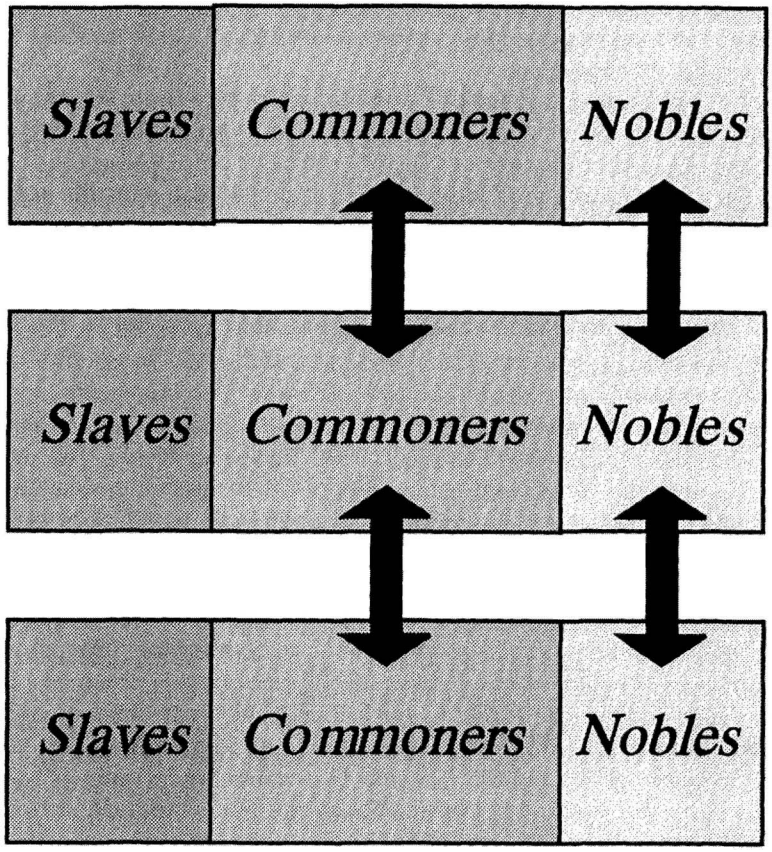


FIGURE 2-3 Rank society interpretation of Northwest Coast society, ranking within households.

extensive research carried out in the last 20 years by Leland Donald and Donald Mitchell of the University of Victoria. Donald and Mitchell have used ethnohistoric records to discover the fit of ethnographic accounts with the material world and resolved a number of previously outstanding questions along the way.

Three distinct social groups existed in Northwest Coast societies—a titled upper class (nobles), an untitled class of commoners who formed the bulk of society, and slaves, as has been long recognized (Suttles and Jonaitis, 1990) (Figure 2-4). The senior noble in each household acted as head of the household, controlling most resource rights and directing the economic and ceremonial activities of the household. Ownership of resource locations such as salmon fishing locations was limited to nobles and was typically inherited and validated in public ceremonies (Richardson, 1982).

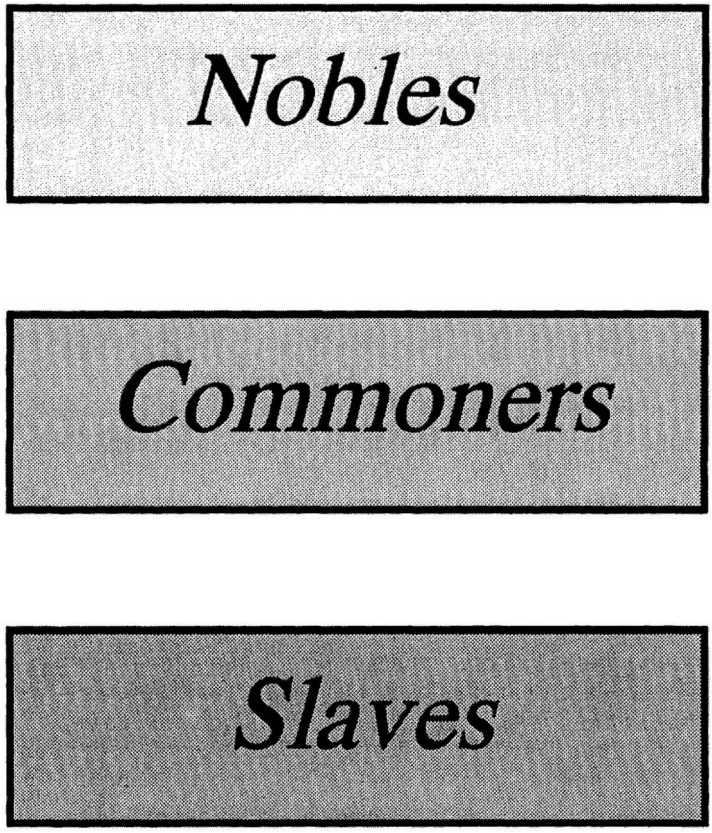


FIGURE 2-4 Class interpretation of Northwest Coast society; social classes within communities.

Nobles thus can be argued to be a separate social class, distinct from commoners.

Furthermore, Donald (1985) has pointed out that it was to the benefit of nobles for them to profess a rank orientation (i.e., that each household is a single "kinship" unit and that the head of household merely acts for the household as a whole). Thus, the household head presents his control of wealth to nonnoble members of his household as being "custodial" for the kin group or household and not as the personal wealth of the household head. In this way commoners, who might receive few benefits directly, might be persuaded to add to the household's (and household head's) wealth and prestige. In fact, as Donald points out, nobles limited certain kinds of interaction, such as marriage and potlatching, specifically to other nobles, represented by the arrows in Fig. 2-3, which is more indicative of a stratified than a rank society. In this view, seeing Northwest Coast culture as

a rank society rather than a class-based society may be more of a rationale foisted off on anthropologists by their noble-class informants than a reality.

Although both provided labor, commoners were distinguished from slaves in the sense that commoners were nominally free and could move their labor from one house to another if they chose to do so. Commoners usually did not acquire titles or control over resource locations. Slaves, on the other hand, were a form of property, who lacked control of their own labor, and who could be given away or even killed by their owners (Ruyle, 1973; Mitchell, 1985). It is hard to see how slaves could be considered to have "equal access to the necessities of life" and not difficult to conceive that during food stress commoners might not have access equal to that of nobles either.

The ethnohistoric account in the sidebar of a raid and what happened to the captives obtained shows that slaves represented a valuable and useful form of wealth, in addition to their productive uses in processing natural resources and making objects of value. They were also used for mundane activities such as gathering firewood, and their very presence increased the status of their owners.

> Mitchell (1984) reports that on August 11, 1837, the Nawitti on north Vancouver Island had been raided by Tsibasa, a southern Tsimshian leader, who killed a number of men and took 20 women as slaves. On August 16, two Stikine Tlingit nobles left Fort Simpson to go to the south to trade for the slaves. The Tlingit returned on August 24 with a number of the Nawitti slaves, and soon left to go north to their homeland with the slaves. Tsibasa showed up at Fort Simpson to trade on Oct. 18 with furs, some of which were known to have come from the Tlingit. Tsibasa's trade goods were used in December in a very large feast he hosted.
>
> The sequence of events is clear: first, a raid, which produced booty and slaves; two, trading the slaves for furs with a group further away (slaves were usually traded some distance from their homeland so they would have less chance of running away); three, exchanging the furs for trade goods; and four, using the trade goods as gifts in a large feast or "potlatch," which enhanced the raider's prestige and status. As Mitchell points out, the entire sequence of events occurred in about four months, showing that warfare and slaves could lead rapidly to increased prestige and wealth. It should also be noted that Tsibasa could expect high-status treatment at future feasts and valuable gifts in return.

Accumulation of wealth and status were overriding concerns on the Northwest Coast. The reasons for this have long been debated in the anthropological literature (Suttles, 1962, 1968; Piddocke, 1965; Drucker and Heizer, 1967; Ruyle, 1973; Donald and Mitchell, 1975), but the overall effect is clearly exhibited in a number of ways, including the presence of ascribed status differences, slavery, warfare, a complex exchange system,

and an elaborate artistic tradition. These cultural features are basic to the Developed Northwest Coast Pattern.

That status and wealth were closely connected everywhere appears to be clear. The exchange of "wealth" items for status, whether relatively directly and rapidly, as the example in the sidebar indicates, or more indirectly and occurring over a longer period, is another constant on the Northwest Coast. As Suttles (1987:65) indicates the conversion of wealth into prestige was everywhere the ultimate goal. Thus individuals, households, and communities with access to, control over, or ownership of greater food resources usually ended up with higher status. For the community level this is elegantly demonstrated by the correlation between median salmon escapements and potlatch rank for the southern Kwakiutl by Donald and Mitchell (1975).

In contrast to the highly developed wealth and prestige systems, political structures are weakly developed along the Northwest Coast. The heads of households appear to have had little influence beyond their houses (Donald, 1990). Formal community political organization is essentially absent (Mitchell, 1983b). Mitchell's (1983b) treatment is especially interesting as he examines the nature of what was seen to be one of the most important early historic "chiefs" on the Skeena River. Political structures to integrate multiple villages and communities are also lacking (Drucker, 1955). The lack of developed political structures stands in contrast with other culture areas that have more developed political structures but much less social inequity.

The Northwest Coast pattern of high social complexity and low political complexity probably explains the little utilization there of the Service evolutionary scheme—bands, tribes, chiefdoms, and the state—(Sahlins and Service, 1960; Service, 1962, 1971, 1975) so used by archaeologists elsewhere. As originally developed, this scheme suggests some sort of "tribal" sodality at an egalitarian level, and a centralized economic and political organization at the nonegalitarian "chiefdom" level. Because the Northwest Coast is clearly nonegalitarian, but lacks "tribal" or "chiefdom" political features, it is difficult to reconcile with the Service scheme. It is of interest that Service's later treatment (Service, 1975) is closer to Fried's (1967) scheme, but that the standard anthropological use of the Service scheme ignores this and focuses on the earlier versions (e.g., Johnson and Earle, 1987).

Environmental and Cultural Differences

At a finer scale of examination, differences become apparent in Northwest Coast environment and culture. The most pronounced differences

exist along two geographical clines: one from south to north, the other from coastal to inland areas.

Resources generally decline in abundance and diversity on the Northwest Coast along a south-to-north gradient (Suttles, 1962), especially with respect to terrestrial productivity (Schalk, 1981). The availability and abundance of aquatic resources is, on the other hand, fairly consistent along the entire Northwest Coast (Ricketts *et al.*, 1985). The northward decline in terrestrial resources probably results from a number of environmental factors. Temperature on land declines steadily northward such that the frost-free season of more than 240 days in northern California is more than halved at less than 120 days for Yakutat, Alaska (Suttles, 1990b). Annual precipitation increases northward, from 1000 mm a year in northern coastal California to over 3000 mm a year in southeastern Alaska, although local factors can eliminate this cline (Suttles, 1990b).

The composition of the forest also changes as one moves north. As indicated previously, the Sitka spruce–Western hemlock forest extends all along the coast, but it is only a thin fringe on the south coast, as immediately inland is the Western Hemlock–Douglas fir forest. This vegetation type is found up to the midpoint of the east coast of Vancouver Island (Suttles, 1990b). Redwoods occur in northern California, as do oak groves in the drier areas away from the coast. Acorns were an important subsistence resource in California, and this is also true for northwestern California and the Oregon coast. Garry oak is found as far north as south coastal British Columbia. Douglas fir is also an important element of the native flora south of Alaska. The central Northwest Coast coastal forest is dominated by red cedar, Sitka spruce, Western hemlock, and Douglas fir (Schalk, 1981). In southeastern Alaska—the Alaskan panhandle—red cedar disappears, leaving forests dominated by Sitka spruce and Western hemlock.

Edible terrestrial biomass is much more abundant and diverse on the south coast than on the north coast. Roots such as camas and wapato occur from California to coastal southern British Columbia, but the abundance of these edible plants declines as one continues to move north. On the north coast the only plant resources that are of any caloric importance are berries, including salmonberries, blueberries, and huckleberries, some roots, shoots, and marine algae, although other vegetable foods may have been significant for nutrients and dietary variety (Suttles, 1962).

Just how important the northward decline in edible terrestrial biomass was in terms of aboriginal human subsistence is debatable. Without doubt, abundance and diversity of plants and land mammals diminishes as one moves north, but recent archaeological evidence (Chisholm, 1986) as well as the studies cited earlier by Baumhoff (1963), Sneed (1971), and Donald and Mitchell (1975) shows that marine resources—we include anadromous salmon here—were by far the most important on all parts of the Northwest Coast, and these resources show no overall tendency to decline along the

northward gradient. There is, however, the fact that the population density on the south coast is higher than elsewhere (Kroeber, 1939), and the south coast has both the widest variety of dietary plant resources and the greatest population density.

The other important gradient in terms of environmental and cultural change on the Northwest Coast is from the outer coast to inland riverine locations. Climate changes along this essentially west-to-east cline, becoming drier and colder as one moves away from the coast through the coastal mountains. More than 240 frost-free days are found on the west coast of the Queen Charlotte Islands, 180 in Prince Rupert Harbour, and only 120 at Terrace, 150 km up the Skeena River. Similarly, precipitation usually declines inland, or in the lee of mountains or islands. The Western hemlock–Douglas fir vegetation is found in areas only with less than 2000 mm, explaining its distribution inland from the wetter adapted Sitka spruce–Western hemlock in the southern half of the Northwest Coast. As an example of this inland drying trend, along the Skeena River total annual precipitation is 2403 mm at Prince Rupert, 1313 mm at Terrace, and only 624 mm further inland at Hazelton (Coupland, 1988a, p. 50).

Faunal availability changes dramatically along the coast–inland gradient. The most obvious change is the loss of marine and intertidal resources as one moves inland. Even at the coast, variability exists from one locale to the next in marine resource productivity. Most sea mammals, for example (see sidebar), are migratory, and their presence on the coast is highly variable and localized. Waterfowl can be abundant in river estuaries, but not elsewhere. Even shellfish tend to be more abundant in outer coastal areas than on the inner coast, if the size and density of shell middens on the central coast of British Columbia is any indicator (Hobler, 1990).

Even the one apparent constant—salmon—varies in availability, density, seasonality, and "storability" between the coast and interior river stretches. Salmon abundance is greatest at the mouths of large coastal rivers, such as the Columbia, Fraser, and Skeena. As salmon enter their natal river systems and begin to swim upstream, spawning populations turn off the main branch into smaller tributaries and streams to spawn, which disperses the salmon run and reduces density in any given location. Most salmon cease feeding in the river estuaries at the beginning of the run stage of their life-cycle. As they proceed upstream, oil content and caloric value steadily diminish. By the time Fraser River salmon reach the Lillooet area, for example, they have lost about half their caloric value (Kew, 1992). The caloric decline in salmon as they run upstream is not necessarily a negative one, though, as it is much more difficult to dry oily fish for storage, compared to less oily ones (Hart, 1973:114). Thus the density, caloric content, and "storability" of salmon all change as one goes upstream.

The length of availability also varies in a monotonic fashion with the coastal–inland gradient. Large rivers have a variety of salmon species and

"runs" present, with the result that a river such as the Fraser has salmon present much of the year. Further upstream, particularly in a smaller salmon river, salmon may be present only as a single run and available as a significant resource for a week or two. As with caloric value, though, this trend often is compensated by an increased density and easier availability at a lower level of technology. Thus, salmon running in a small stream are very evident and can be obtained with very simple technologies, whereas the same salmon lurking in the tidal portion of the river may be very difficult to obtain in large numbers, or even have their presence known.

Finally, salmon are not equally abundant on all parts of the coast. The size, duration, and reliability of the runs covaries with the size and latitude of the coastal river systems. Small coastal rivers typically get small runs of short duration. More northern rivers within British Columbia appear to have more reliable runs than more southern ones (Washbrook, 1992). Salmon runs on the Queen Charlotte Islands are quite small compared to those of the mainland river systems farther south, and as a result the Haida may have depended more on halibut than salmon (Blackman, 1990, p. 244).

Close examination also reveals cultural differences along the Northwest Coast, especially along the south-to-north gradient. With respect to settlement patterns, winter villages and households generally increase in size as one moves north (Suttles, 1962; Schalk, 1981), although the fit here is not perfect. The largest winter groupings were on the central Northwest Coast where some Coast Salish villages included up to 1000 people (Suttles, 1962, 1968), in households of 100 people or more (Ames, 1990). In contrast ethnographic village size in northern California and coastal Oregon was often less than 100 people, although larger villages also existed (Kroeber, 1939; Schalk, 1981:65). Households in the south coast typically included only seven or eight individuals, although households with up to four families also occurred (Seaburg and Miller, 1990). On the northern coast, villages of 500 to 600 people were not uncommon (Schalk, 1981:65), and households are said to typically include 20 to 25 people.

One wonders how these differences of scale of villages and household size affect other cultural attributes, some trends of which are discussed in later paragraphs. For instance, the rank perspective of differences in social status existing within the household or kin group could be argued to fit better in a household that held more than a single family, for how can significant "rank" differences be expressed in a single family? By the same logic, though, the class perspective is easier to fit with larger houses, as how can slaves be a significant, separate class except in large households? An alternative to this perspective may be that the difference between households was greater on the south coast than elsewhere. Even on the central coast, Suttles (1973) points to not only houses without nobles, but even entire villages.

Although smaller, villages of the southern coast were numerous and relatively closely spaced, resulting in small home range territories, whereas northern villages were often distantly removed from each other and had relatively large home ranges (Schalk, 1981). Schalk attributes these differences to the reduced terrestrial resource productivity of the northern forests, and the hypothesis that the resource structure of the north coast is more patchy than to the south. Suttles (1962), on the other hand, sees the differences between the central and north coasts as reflecting the greater diversity and variability of resources on the central coast in contrast to the north coast.

The south-to-north gradient extended to social organization as well. As one moves north, patterns of postmarital residence and descent become increasingly rigid (Suttles, 1962). From the Columbia River south, a patrilineal focus was common, with virilocality being the ideal among the Chinook. A loose bilateral structure existed among the Coast Salish, with serial ranking—that is, having the nobles within a community being ranked from lowest to highest—poorly defined or nonexistent as it was further south, but with "class" divisions separating nobles, commoners, and slaves. The Wakashan-speakers (Kwakiutl and Nootka) also recognized bilateral descent, but with leadership more rigidly determined by patrilineal descent, and with an implicit principle of noble serial ranking also present (Suttles, 1962). Farther north, the Tsimshian, Haida, and Tlingit had even more stable social groups with membership determined by matrilineal descent, and the principle of rank well defined (Suttles, 1962). These trends do not correlate with linguistic trends, indicating the explanation must lie elsewhere.

Systems of exchange also differed from south to north. The Coast Salish practiced a "food-for-wealth" exchange, which, according to Suttles (1960) could function to even out resource fluctuations (and was a way of trading food for prestige). Potlatches were more common in the north, although the reasons for potlatching varied among ethnic groups, some holding only mortuary potlatches, others to commemorate the building of houses or raising of poles. In all areas feasts were held that enhanced the prestige of their noble hosts. South of the Columbia River, formal potlatches were nonexistent, although generalized feasts were common.

Riches (1979) argues that the increased rigidity of social organization on the north coast is a response to the lower levels of reliability present among the resources there. In contrast, he argues that the wider variety and greater reliability of resources found among the Coast Salish region allow for a less rigid social organization. Although this idea cannot currently be rejected, Washbrook's (1992) research indicates that salmon, the most important resource, is more reliable, as measured by year-to-year variability, on the north coast rivers, than on the central coast, which is a trend opposite from that predicted by Riches, but in line with that argued by Suttles (1962).

Material culture was remarkably consistent along the entire Northwest Coast, but specialized technologies were found in some areas. For example, the Straits Salish of the southern Gulf of Georgia were the only ones to use the reef net (Suttles, 1951), perhaps the most complex fishing technology on the Northwest Coast. Reef net locations were "owned" and inherited. The fishery itself included two anchored canoes at the reef and a third canoe that transported fish between the net and the land. A dozen adult men, under the control of the reef net "captain" ran the set with probably at least the same number of women processing the fish on shore. The scale of this kind of activity can be seen at Cannery Point on Point Roberts, Washington, where nineteen such reef net locations are known, along with the permanent shore installations to support them (Suttles, 1951).

Riverine fishing techniques also differed by area. The dragnet, a possible forerunner of the reef net, was used by Salish groups on the lower Fraser River (Kew, 1992), whereas basket traps were more commonly used by the Tsimshian along the Skeena River (Nolan, 1977). Weirs were used throughout the area on appropriate coastal streams. Tidal fish traps are common on the north coast. The Haida of the Queen Charlotte Islands were famous for their large ocean-going canoes, which were used to make the crossing of Hecate Strait to the mainland, and which were traded widely on the north coast. Pelagic sea mammal hunting was practiced by the groups living on the west coast of Vancouver Island and the adjacent coast of the Olympic Peninsula. It is here that groups sought out, harpooned, and captured whales, an activity not known to have occurred elsewhere.

House types differed in design along the Northwest Coast (Figure 2-5). The Coast Salish favored the shed roof design with horizontal wall planking, whereas to the north and the south the gable-roofed house was built. The Coast Salish houses typically had permanent frames, but the planks were moved seasonally to other settlements. Some Coast Tsimshian followed a similar practice when they moved from their winter coastal villages to their riverine summer villages, as did some Kwakiutl.

The Coast Salish also built multihousehold houses; each household was located in an "apartment" segment within the house, which could have been several hundred feet long. One such structure, described by Simon Fraser, housed almost 400 people and had an estimated area of 3,456 sq. m (Ames, 1990). This design was also seen among the Chinook and, occasionally, along the southern Oregon coast.

The gabled roof houses on the north coast incorporated a relatively permanent plank and beam structure and were typically much larger than those south of the Columbia. The gabled houses found south of the Columbia River (the south coast) usually lacked a true frame with beams; the redwood or cedar planks functioned as both curtain wall and frame.

Linguistically, the Northwest Coast is an area of great diversity. Some languages appear to be isolates, and their relationships to the larger lin-

guistic phyla of North America are remote and uncertain. This apparent linguistic distance may reflect the separation of many Northwest Coast groups from other North American Indians at a time in the early Holocene. Tlingit appears to be related to Athapaskan languages (Thompson and Kinkade, 1990). Haida may also link with the Tlingit and Athapaskan languages to form the the Na-Dene phylum (Dyen and Aberle, 1974), although the existence of Na-Dene itself as a linguistic unit is debated by some (Thompson and Kinkade, 1990). Athapaskan languages are also found

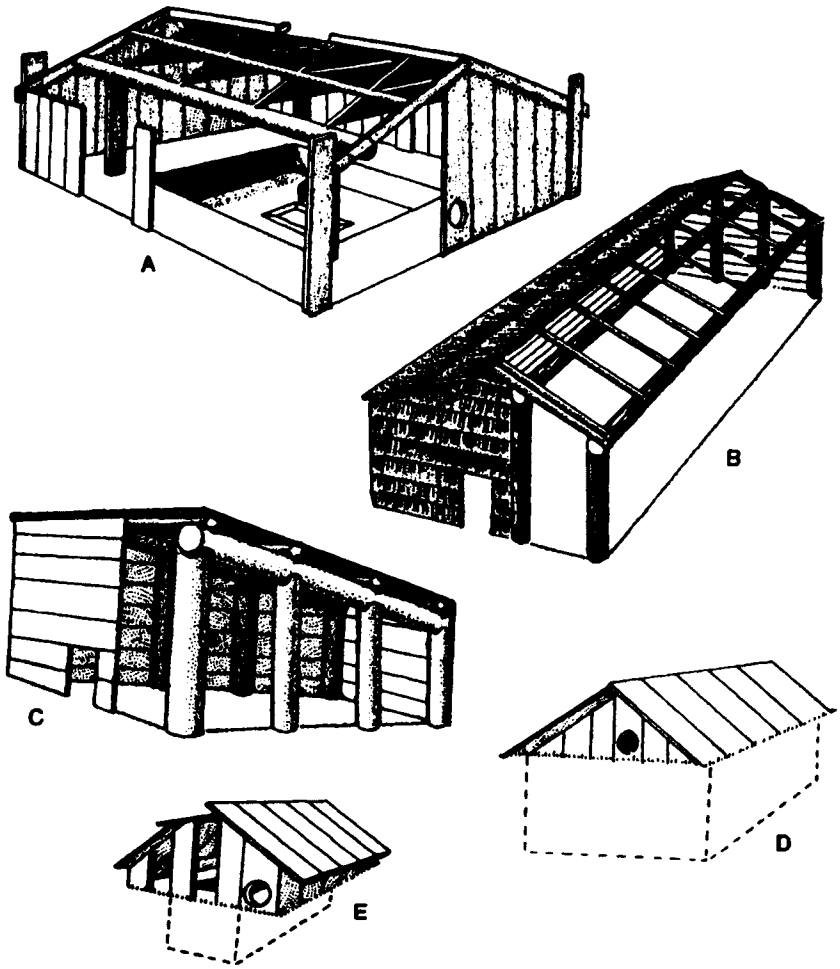


FIGURE 2-5 Northwest Coast house types. (A) Northern gabled roof. (B) Gabled roof, Wakashan type. (C) Shed roofed type. (D) Southern gabled roof, without frame. (E) Southern, three pitched roof form. (From Drucker, 1965.)

along the Oregon coast and northern California; these are closely related to Canadian interior Athapaskan languages, indicating a separation in the last 1500 years. Tsimshian is considered by many linguists to be a Penutian language, related to other languages of that family in southern Oregon and central California (Thompson and Kinkade, 1990). Others argue, however, that Tsimshian is an isolate, hybrid language incorporating elements of many other Northwest Coast languages. Whereas many culture areas of native North America are represented by just one or two language families, the Northwest Coast is represented by a minimum of four families, including Penutian, Wakashan, Salishan, and the uncertain Na-Dene.

In his tripartite division of native North American languages, Greenberg (1987) shows two—Na-Dene and Amerind—well represented on the Northwest Coast. Only Eskimo-Aleut, which is geographically restricted to the coast of Alaska west of the Panhandle and the arctic, is not found on the Northwest Coast. Even then, there may have been substantial late prehistoric contact between North Tlingit and Eskimo and Aleut groups (de Laguna *et al.*, 1964).

Cultural differences on the Northwest Coast are strikingly apparent when one compares groups north of the mouth of the Columbia River to those south of this dividing line. As indicated in the first half of this chapter, the monumental art and complex exchange systems, key features of cultures from the Columbia River north, are greatly attenuated in cultures south of the Columbia. Perhaps the Northwest Coast cultural tradition does not terminate abruptly, but rather diminishes gradually at the southern end.

In summary, although variability exists throughout the area, the salient features of Northwest Coast culture include an overriding emphasis on personal wealth and status, with a large component of that status being inherited or ascribed. In the absence of domesticates, the economic underpinning was the intensive harvesting and preserving of natural resources, especially salmon. With hereditary status differences, multifamily households, and complex exchange systems, Northwest Coast societies were much more complex than most other ethnographic hunting-and-gathering societies. These general commonalities existed along the Northwest Coast from at least the mouth of the Columbia River to southeast Alaska despite long-standing language differences. These commonalities are what we refer to when using the term *Developed Northwest Coast Pattern.*

3

History of Archaeological Research

* * *

INTRODUCTION

In contrast to the early and continuous ethnological research in the Northwest Coast, archaeological research has had a more uneven course. Early archaeological research dates to the late nineteenth century, when pioneering investigations were conducted on the coasts of Oregon (Schumacher, 1874, 1877a, 1877b), Washington (Eells, 1886; Wickersham, 1896a, 1896b, 1900) and British Columbia (Deans, 1891, 1892). Despite this early start, the growth and development of Northwest Coast archaeology was slow and uneven in comparison with other areas in North America. This observation is not new; Philip Drucker (1943:23) once commented on the "grievous neglect" of archaeological research on the Northwest Coast, and Erna Gunther (1972:xi) later remarked that "the Northwest Coast has had one

of the richest Indian cultures in North America—and the poorest archaeology." With its high mountains, rugged coastline, dense foliage, and wet climate, the northern Northwest Coast has never been an easy place to do archaeology. Even today, many areas remain isolated and remote, away from the urban centers where archaeologists are located and where the land surface modification that results in much of modern contract archaeology is concentrated. Most of what we know about Northwest Coast prehistory has come from research conducted only within the last 35 years. As recently as the early 1960s large areas both in the rugged north coast and along the south coast remained unexplored archaeologically. Beginning in the middle 1960s, however, a number of field projects were initiated that have greatly increased our understanding of Northwest Coast culture history and the processes of prehistoric cultural change. Cultural sequences now exist for most areas of the coast; models of cultural change are being developed and tested; and the growth of cultural resource management in the past few decades has resulted in better protection of heritage sites.

LATE NINETEENTH AND EARLY TWENTIETH CENTURY INVESTIGATIONS

Two turn-of-the-century scholars who made important contributions to the foundation of Northwest Coast prehistory were Charles Hill-Tout and Harlan I. Smith. Both men can be credited with developing influential migration theories to explain cultural change on the coast. Hill-Tout argued that the Northwest Coast was originally populated by people of "Eskimo" origins (Hill-Tout, 1895). Hill-Tout was the first to excavate the Marpole site near the mouth of the Fraser River (Figure 3-1). Relying mainly on a small sample of human skeletal evidence, especially cranial shapes, Hill-Tout put forth a sequence in which a long-headed population was succeeded by a broad-headed one. He reckoned the early population to be of Eskimo origins.

Harlan I. Smith, who worked with Boas's Jesup North Pacific Expedition, excavated and surveyed sites over a considerable area, from Puget Sound north to the Skeena River (H. I. Smith, 1903, 1907, 1909, 1929, 1930; H. I. Smith and Fowke, 1901), including extensive work at the Marpole site. Smith's work, although broadly based, did not result in formal cultural sequences for any of these areas, as it was not until the work of A. V. Kidder (1924) that cultural sequences became an important part of New World archaeology. Smith did, however, propose a model, based on cranial differences, of interior-to-coast migration to account for the early human colonization of coastal British Columbia (H. I. Smith, 1907:430–38; see also Kroeber, 1939), a theory that also influenced later scholars (e.g., Drucker,

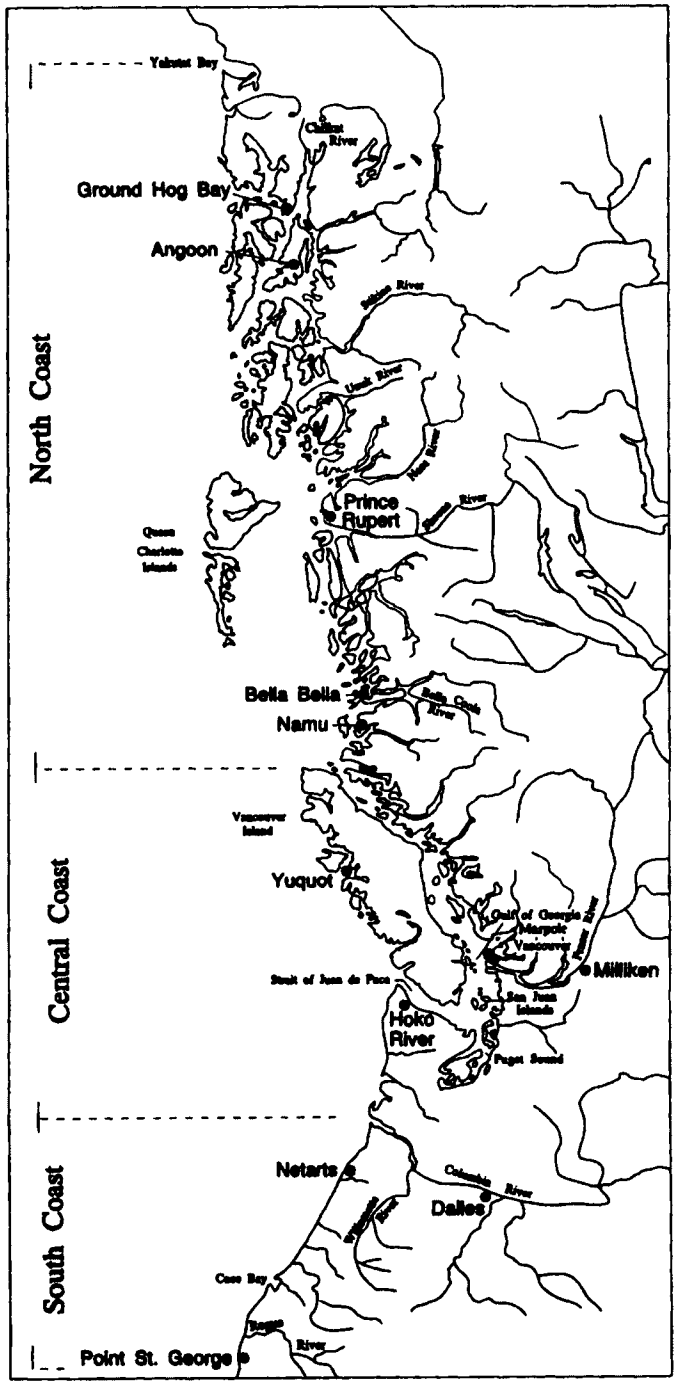


FIGURE 3-1 Northwest Coast locales of archaeological importance.

1943). According to Suttles (1987, p. 258) and Robinson (1976), it was actually Boas who persuaded Smith that this difference in craniums was significant.

Late nineteenth and early twentieth-century archaeology on the Northwest Coast was, not unexpectedly, largely exploratory in nature. With the exception of Smith, the practitioners of much of this early archaeology were ethnologists, who, influenced by Boas, saw archaeology as a means for investigating the past of contemporary ethnographic groups. Migration, involving movements of Eskimo populations along the coast and movements of Plateau groups from the interior, was offered as the most likely mechanism to account for changes in the archaeological record.

After this early burst of activity around the turn of the century, little archaeological research was published until World War II. This lack of archaeological investigations is in contrast with the increase in activity seen in most other North American areas. Although such research as was carried out continued to be exploratory, it differed from the earlier period in two respects. First, archaeology became a field of endeavor in its own right on the Northwest Coast, with pioneers such as Luther Cressman, W. D. Strong, and Frederica de Laguna. As described in the sidebar, from the beginning de Laguna combined ethnography and archaeology.

> Frederica de Laguna represents a direct link to the embryonic development of anthropology and archaeology in the early twentieth century in North America. Born in the United States in 1906, she studied under Franz Boas and Ruth Benedict at Columbia University beginning in the late 1920s. In 1929 she also spent one semester studying under Malinowski at University of London. Her field experience began in the summer of 1930 when she accompanied the Danish anthropologist, Therkel Mathiassen, on an ethnographic expedition to Greenland. De Laguna credits her association with Mathiassen, and later with another Danish anthropologist, Kaj Birket-Smith, as having a profound effect on her decision to pursue a career in anthropology (de Laguna, 1977).
>
> In 1930, de Laguna made her first field trip to Alaska, to Cook Inlet, returning there three years later with Birket-Smith. In the meantime, she completed her Ph.D. at Columbia, and her dissertation, entitled "A Comparison of Eskimo and Paleolithic Art," was published in 1932–1933. In the years before World War II, de Laguna concentrated mainly on the Eskimo archaeology of Alaska, just to the north of the Northwest Coast. She published *The Archaeology of Cook Inlet, Alaska* in 1934, and coauthored with Birket-Smith an ethnography of the Eyak Indians of the Copper River delta in 1938. *Chugach Prehistory: The Archaeology of Prince William Sound, Alaska* was published in 1956. After the war, she turned her attention to the Tlingit of southeastern Alaska. Fieldwork began at Yakutat Bay, the northern extent of the Northwest Coast, in 1949. This research culminated in two published monographs, including *Archaeology of the Yakutat Bay Area, Alaska* (de Laguna *et al.*, 1964), and her monumental, three-

volume work entitled *Under Mount Saint Elias: The History and Culture of the Yakutat Tlingit* (de Laguna, 1972). The latter work demonstrates, perhaps better than any other, de Laguna's Boasian commitment to the four-field approach in anthropology, and her abilities as ethnographer, ethnohistorian, and archaeologist. The four-field approach was earlier in evidence in her work among the Angoon Tlingit in 1949 and in the 1950s (de Laguna, 1960). Her report of the artifact assemblages from Daax Haat Kanada and Yaay Shanoow have long been used as the standard description of Tlingit material culture.

Now retired from the Department of Anthropology that she founded at Bryn Mawr College, although she still continues to write and publish, Frederica de Laguna's career has spanned more than sixty years and multiple subdisciplines. She is truly a pioneer of Northwest Coast anthropology.

Second, while theories of migration continued to predominate in the explanation of cultural change, less emphasis was placed on the physical anthropological evidence than in the early period of research, and more time was spent developing artifact typologies. Drucker led the way in this regard. His 1938 survey and excavations in the Coast Tsimshian (near Prince Rupert, Figure 3-1) and Bella Bella areas resulted in a detailed typology of stone, bone, and antler tools (Drucker, 1943). Using the direct historic approach, Drucker (1943:112–113) proposed a recent downriver migration by the Tsimshian, and his investigations were the first significant archaeological work carried out between Vancouver, B.C., and Yakutat Bay.

In the 1920s and 1930s, research projects in Oregon concentrated on the middle and lower Columbia drainage. The Dalles-Deschutes (Figure 3-1) region was first investigated by Strong, Schenck, and Steward (1930). Later Cressman developed a cultural sequence for this critical locality (Cressman et al., 1960), at the east margin of the Northwest Coast area. At the same time a few sites were excavated in coastal Oregon (Berreman, 1944; Leatherman and Krieger, 1940). Of this work, only the work at the Dalles by Cressman turned out to lead to significant further developments.

MID-TWENTIETH CENTURY INVESTIGATIONS

In the late 1940s university expansion and the establishment of new funding agencies helped to support archaeological research of longer duration on the Northwest Coast. Following 60 years of exploratory and descriptive research, the first regional cultural sequences were developed. In northwestern Washington, fieldwork began in the San Juan Islands (Figure 3-1) in 1946 under the direction of Arden King. King's excavation of the Cattle Point site (King, 1950), resulted in one of the first chronologies

for the Gulf of Georgia area. His sequence, however, was not widely adopted (R. Carlson, 1990a:108).

Perhaps the most significant archaeological research of the immediate postwar years was initiated by C. E. Borden in the Fraser delta region. Borden (see sidebar) between 1946 and 1952 undertook large-scale excavations of sites in the Vancouver area including Point Grey, Marpole, Locarno Beach, Stselax, and Whalen Farm. This work culminated in the establishment of an initial three-period sequence for the Fraser delta based on comparisons of assemblage content and stratigraphic position, an analytical first for the Northwest Coast (Borden, 1950, 1951). The Early Period, which he later named the Locarno Beach Phase, included cultures thought to be of Eskimo origin. There then followed an Intermediate Period—which he later designated the Marpole phase—in which Borden envisioned Plateau cultures, which had migrated to the coast in a "state of transition" to a maritime way of life. Borden referred to the late period as the "developed southern aspect of Northwest Coast culture" (Borden, 1951), and named it after the Stselax site.

One of the most important pioneers in Northwest Coast archaeology was the late Charles E. Borden. Borden was born in New York City in 1905, and his father died while Borden was still an infant, so his mother took him to Germany where she had relatives. During the 1920s he discovered by accident that he was a U.S. citizen, and he returned to the United States where he obtained a bachelor's degree in German from the University of California at Los Angeles in 1932 (R. Carlson, 1979). He then carried out graduate work in German at the University of California at Berkeley, where he received a Ph.D. in 1937. During this time he also sat in on anthropology courses at Berkeley. He taught for two years at Reed College in Portland, Oregon, and then moved to the University of British Columbia at Vancouver in 1939. During World War II, access to German research materials was very limited for someone of his background, and he explored his interest in archaeology. His first major excavations were in 1945 and 1946 at the Point Grey site, adjacent to the University of British Columbia campus, and he very rapidly formulated the Fraser delta sequence, based on further excavations at Locarno Beach, Whalen Farm, Marpole, and on the Musqueam reserve (Borden, 1950, 1951). This work formed the foundation for Northwest Coast culture history. At this time he began to teach archaeology, at first as an overload course, in the forerunner of the current anthropology and sociology department.

In addition to this continuing work in the Fraser Delta, Borden also worked in the central interior and southeast portions of British Columbia (Borden, 1952a, 1956), as well as very important Fraser Canyon work (Borden, 1960, 1975). All the while he was also setting the stage for proper antiquities legislation and developing the four-letter site designation scheme used in Canada (Borden, 1952b). This impressive career was carried out essentially in addition to his German teaching duties as it was

not until 1968 that he was allowed to instruct more than one course per year in the anthropology and sociology department—and he retired in 1970! In retirement he remained active and influential until his death in 1978.

Because Borden was largely self-taught in archaeology, his field methodology was not what was standard in postwar North American archaeology—it was far more careful and rigorous! Perhaps because of his concern with rigor, he was never able to complete detailed descriptive reports; it was left for his students, Donald Mitchell (1971b) for the coast and David Sanger (1970) for the southern interior of British Columbia, to write the descriptive monographs that could be used in detailed comparative studies.

Carl, as he preferred to be called, did not suffer fools gladly, and appeared to outthink junior colleagues and students with ease. This intimidating intellect was also capable of great generosity; the junior author of this volume was supported while writing his dissertation by a fellowship funded from the personal property of Borden, given in the name of himself and his first wife, Alice, for the great interest of his life—and ours—the prehistory of Pacific Canada.

On the far north coast, Frederica de Laguna (see sidebar) began archaeological and ethnological research at Yakutat Bay (Figure 3-1) in southeastern Alaska in 1949 (de Laguna *et al.*, 1964; de Laguna, 1972). Comparison of the Yakutat material to excavated assemblages from southwestern Alaska (de Laguna, 1934, 1956) led de Laguna to the hypothesis that northern Northwest Coast culture was "built on a foundation" of long-standing Aleut-Pacific Eskimo contact (de Laguna, *et al.*, 1964:207–10). De Laguna continued to work in the Tlingit area, moving to the Angoon locality (de Laguna, 1960).

The practice of archaeology was radically changed in the early 1950s with the introduction of radiocarbon dating. Within 10 years, early human occupation in two areas on the eastern margins of the Northwest Coast—the Dalles in Oregon and the lower Fraser Canyon in British Columbia—had been securely dated to greater than 9000 BP, much earlier than had heretofore been thought. Both areas produced complete or nearly complete sequences for virtually the entire period of the Holocene. Cressman's sequence at the Dalles (Cressman, *et al.*, 1960), begins at almost 10,000 BP. Borden's Fraser Canyon sequence (Borden, 1960) is known mainly from excavations at the Milliken site near Yale on the very inland edge of the Northwest Coast area and the neigboring Esilao site. The nearly uninterrupted sequence includes seven phases and dates from 9000 BP to historic times.

Work continued through the 1950s in the Gulf of Georgia and Puget Sound areas. R. Carlson (1954, 1960), working in the San Juan Islands, rejected King's developmental sequence, establishing instead a two-period chronology that was more in line with Borden's Fraser delta sequence. He

also produced the first useful site reports for this area, as Borden never published detailed descriptive site reports on his investigations. Bryan (1963) added to the growing list of recorded and excavated sites in the area of northern Puget Sound.

RECENT RESEARCH

Since Borden's initial three-period formulation for the Fraser delta, a number of changes have occurred. Further field research has established two periods of coastal occupation earlier than those recognized by Borden (Calvert, 1970; Matson, 1976, 1981), and ideas about Eskimo origins of Northwest Coast culture have been largely abandoned by most researchers. As elsewhere in North America, explanation of cultural changes by whole-scale migrations became unpopular (Mitchell, 1969). Yet, through all of these changes, Borden's three archaeological cultures have endured. His Fraser delta chronology was "the first coastal sequence of archaeological cultures to become widely used and withstand re-investigation" (R. Carlson, 1990a:108). In view of the lack of descriptive publications of his own work, it was left for others, such as R. Carlson, to describe examples of the Fraser delta sequence. In particular, Mitchell's investigations at the Montague Harbour site led to the first full, detailed synthesis of the archaeology of Gulf of Georgia region, and the most detailed site report for the region yet published (Mitchell, 1968b, 1971b). With the publication of this site report and extensive review of Gulf of Georgia archaeology, the Fraser delta sequence can be considered to be fully verified. Mitchell continued to produce descriptive reports of fieldwork from that time through the 1990s.

By the mid-1960s lengthy chronologies, such as the Fraser delta sequence, existed for only a few areas of the Northwest Coast, and there were still many areas that had received very little investigation. This situation changed substantially over the next 10 years as the pace of archaeological research on the Northwest Coast accelerated. In 1966, the North Coast Prehistory Project was initiated by George MacDonald of the National Museums of Canada. This far-ranging project covered an area from Hazelton on the middle Skeena River to the Queen Charlotte Islands. The main area of investigation was Prince Rupert Harbour (Figure 3-1), where MacDonald proposed a three-period cultural sequence spanning the last 5000 years (MacDonald, 1969; MacDonald and Inglis, 1981), although this material remains to be fully described. Reports do exist of related work in Kitselas Canyon by Allaire (1978, 1979) and Coupland (1985b, 1988a) that include cultural material extending back to 5000 BP. Farther up the Skeena River at Hagwilget Canyon, which was also excavated as part of the North Coast Prehistory Project, Ames (1979) developed a sequence that covers the last 3500 years.

MacDonald's work on the Queen Charlotte Islands was mainly concerned with burial sites (MacDonald, 1973; Cybulski, 1973). Knut Fladmark, however, continued the investigation of culture history with excavations at three sites, resulting in a sequence beginning about 7500 BP (Fladmark, 1970a, 1970b, 1975, 1979, 1986a). Severs (1974a) also conducted cultural history-orientated excavations on the Queen Charlotte Islands.

Farther north in southeastern Alaska, even earlier components with microblades, dating to nearly 9000 BP, were recovered first at Ground Hog Bay (Figure 3-1, Ackerman, 1968, 1974; Ackerman, Hamilton and Stuckenrath, 1979), and later at Hidden Falls (Davis, 1989). On the central coast of British Columbia, research initiated by the University of Colorado in the 1960s (Hester and Nelson, 1978) in the Namu area introduced "ecological archaeology" (Meighan *et al.*, 1958, 1959) to the Northwest Coast, emphasizing the investigation of subsistence strategies and the nature of past environments. Investigation of this area was continued by Simon Fraser University (Hobler, 1970, 1972; R. Carlson, 1979), and confirmed earlier results that human occupancy of this area was as old as that in southeastern Alaska. By the early 1970s it was becoming increasingly clear that the early northern microblade tradition was distinctly different from contemporary material on the central coast.

Elsewhere on the Northwest Coast large-scale archaeological projects were initiated in the mid-1960s on the west coast of Vancouver Island at Friendly Cove (Yuquot, Figure 3-1), where a 4500-year cultural sequence was proposed (Dewhirst, 1980), and at nearby Hesquiat Harbour (Cybulski, 1978; Calvert, 1980; Haggarty, 1982). A number of projects were started or continued in the Gulf of Georgia area. Excavations at the St. Mungo Cannery site (Calvert, 1970) and the nearby Glenrose site (Matson, 1976) in the Fraser delta resulted in the extension of the cultural sequence for the area to greater than 8000 BP. These were also the first complete "ecological archaeological" investigations on the Northwest Coast.

The Pacific coast of Washington was first explored by investigators from Washington State University in the late 1940s (Daugherty, 1948) who continued work in the 1950s and 1960s. This work resulted in the excavation of a number of sites dating in the last 2000 years (Roll, 1974; Wessen, 1990). Two more recent projects concentrated on water-saturated deposits. The Ozette Project was begun in the late 1960s on the outer coast of the Olympic Peninsula (Gleeson and Grosso, 1976; Samuels, 1983; Huelsbeck, 1988; Wessen, 1988), and later the Hoko River Project (Figure 3-1) was started (Croes, 1976; Croes and Blinman, 1980). These two projects produced a wealth of information on perishable material culture, with Ozette also producing information on late prehistoric houses and living arrangements.

By the early 1970s water-logged sites had been recognized and excavated at a variety of places on the central and north coast. A volume edited by Croes (1976) pulled together these early investigations. On this base, a

separate subfield, the investigation and analysis of water-logged perishables developed, led mainly by Croes (1976, 1987, 1989a, 1989b, 1992a) and Bernick (1983, 1987, 1989). These investigations have given us additional insights to the 90% of the technology that usually does not survive into the archaeological record (Croes, 1992a), and a unique way to investigate questions of tradition and ethnicity.

After the early start mentioned above, the investigation of the coast south of the Columbia languished, with no significant excavations taking place until 1956, when L. Cressman initiated a three-year project funded by the National Science Foundation (T. M. Newman, 1959). This project focused on the later archaeology of the Tillamook, along the northern Oregon coast, and resulted in descriptions of late prehistoric and historic houses as well as some of the first published radiocarbon dates on the Northwest Coast (T. M. Newman, 1959). Further south along the Oregon coast, no significant excavations occurred until the 1970s when Oregon State University initiated a series of projects (Draper, 1988) that continue today according to Ross (1990). In northern California, Gould's (1966) investigation of the Point St. George (Figure 3-1) locality remained the only significant research in that area until the 1980s. Gould's research, like that of de Laguna, at the opposite end of the Northwest Coast, integrated ethnographic inquiry with archaeological research. It has only been since the 1980s that material older than 2000 years has been recovered from south of the Columbia River.

Thus by the mid-1970s lengthy, detailed chronologies existed for many areas—but not all—of the Northwest Coast, and archaeologists began to turn their attention to questions of cultural process. Ecological models, stressing human interaction with the environment, were advanced to explain prehistoric change on the Northwest Coast in terms of cultural adaptation rather than migration or diffusion. We mentioned earlier the pioneering work of Hester at Namu in the late 1960s, although the results were not published until 1978 (Hester and Nelson, 1978). Gay Calvert independently developed a similar approach (Calvert, 1970; Boehm, 1973; Calvert, 1980), and Matson (1976, 1981) organized the first complete analyses of this sort on the Northwest Coast. In line with this cultural ecological paradigm, a number of studies since the early 1970s have focused on prehistoric settlement (Thompson, 1978; Calvert, 1980; Haggarty, 1982) and subsistence patterns (Matson, 1976, 1981, 1992; Matson *et al.*, 1980, 1991; Ham, 1982; Ham *et al.*, 1986; Mitchell, 1988a; Moss, 1989b).

In recent years, studies have focused on particular aspects of prehistoric Northwest Coast culture, including social organization (Ames, 1981, 1983, 1985; Matson, 1983, 1985; Coupland, 1988b), and economies (Schalk, 1977; Burley, 1979b; Matson, 1983, 1992; Isaac, 1988; Croes and Hackenberger, 1988; Croes, 1992b). These studies have developed and tested models about the origins of social inequality, sedentary village life, and economic

intensification on the coast. A volume devoted to the evolution of the distinctive Northwest Coast artistic tradition has been published (R. Carlson, 1983c), and a detailed synthesis of one particular prehistoric culture—the Marpole Culture—has been produced (Burley, 1980).

SYNOPSIS

The history of archaeological research on the Northwest Coast dates to the late nineteenth century, but it was not until the 1960s that the first detailed chronologies in Northwest Coast prehistory were developed and verified. The work of C. E. Borden in particular, led the way in this regard. Since then, research has been divided between filling the gaps in the chronological record and developing and testing models that seek to understand the process of cultural change on the coast. In addition, the field of cultural resource management has come to the fore in the last 20 years, accounting for much of the fieldwork that has been done during that period.

For many years our knowledge of traditional Northwest Coast culture was based largely on ethnographic and linguistic research; that situation has changed in the past few decades. Prehistoric cultural sequences now exist for most areas, and models of cultural change are being developed and tested. Archaeology, it can finally be said, is now making a significant contribution to our understanding of the development of the Northwest Coast cultural pattern.

This page intentionally left blank

4

The Initial Colonization of the Northwest Coast

* * *

INTRODUCTION

Understanding the nature of the first Northwest Coast cultures requires knowledge of their antecedents, the first human inhabitants of the Western hemisphere. In this chapter we first describe the peopling of the New World and then Clovis, the earliest definite New World culture. Clovis has long been known south of Canada, but a related, and probable antecedent culture in Alaska, the Nenana Complex, has recently been discovered, and we review this new material, as well as new evidence on the possible routes between interior Alaska and the Northwest Coast. Later in this chapter we describe the probable relationship between Clovis and the first archaeological cultures on the south and central coasts.

Microblades were used by the probable second group of migrants from Asia to the New World. The earliest archaeological material on the north coast also has abundant microblades. We describe the early microblade material from Alaska, the Denali Complex, and discuss its relationship with Clovis and possible Asian progenitors. Once these two early Alaskan archaeological cultures are reviewed, we are ready to turn to the earliest cultures on the Northwest Coast. On the south and central coasts we find the Old Cordilleran, a probable descendant of Clovis, and further north, the North Coast Microblade Tradition.

PEOPLING OF THE NEW WORLD

The basic questions regarding human migration to the New World are who, how, and when. The first question is probably the least controversial and easiest to answer, as almost all workers agree—and have agreed for many years—that the ultimate source of American Indians is east Asia. The Asiatic origin of American peoples is apparent in hair, dentition, and blood types. Turner (1985) argues for a specific Asian subgroup as being the source, the Sinodonts. Turner divides Asian populations into two groups on the basis of dental morphology. Sundadonty is his name for a class that is found among the Ainu of Japan, the non-Chinese inhabitants of Taiwan, and other southeast Asians. The Sinodonty include most Chinese, Japanese, and other northern Asian groups. Because dental characters can be sensitive genetic markers, and teeth are frequently recovered from archaeological deposits, Turner's procedure is an effective way to classify prehistoric populations. Turner (1985) uses a total of 27 dental traits, including such characters as type and abundance of shovel-shaped incisors (abundant in Asian and American populations), and number of cusps and roots on selected molars to make these classifications. On the basis of his analysis of these dental characters, Turner (1985) argues that all New World aborigines descended from early migrations of people with the Sinodonty dental pattern.

The Eskimo-Aleuts are conventionally seen as a later migration into North America, separate from the first one, but also from Asia. As noted in Chapter 2, Greenberg (1987) sees three basic language groups in the New World: Amerind, Eskimo-Aleut, and Na-Dene, the last a proposed language family that includes Athapaskan, Tlingit, and Haida. Greenberg (1987) argues that the Amerind languages, by far the largest and most diverse group, are the result of the first migration. In his view, this tripartite linguistic pattern is the result of three separate migrations, with the Na-Dene sandwiched between the Amerind and the later Eskimo-Aleut migrations.

Turner (1985) discovered three distinct groups in his analysis of North American material, all variants of Sinodonty, that generally correspond to

Greenberg's three linguistic groups. He finds that the oldest North American human remains belong to the group he associates with Amerind language speakers. Interestingly enough, the only area that Turner finds to vary significantly from this linguistic–dental correspondence is the Northwest Coast, which includes both Amerind and Na-Dene languages but which has a very homogeneous dental pattern. The Northwest Coast sample is closely linked to both Athapaskan (Na-Dene) and Southwestern Pueblo dental data (Turner, 1985, p. 39).

Williams *et al.* (1985), in a study using human immunoglobulin Gm allotypes, also support an Asian—actually Siberian—origin for North American peoples. They also report a pattern of New World allotypes that they interpret as substantiating Greenberg's and Turner's tripartite division of Amerind, Eskimo-Aleut, and Na-Dene. Thus, as well as traditional judgmental evaluations about the Asiatic origins of New World aborigines, three recent investigations of language, teeth, and genetics support a tripartite division indicating three separate migrations. In all three analyses, though, the migrations are from Asia.

The evidence of three separate migrations resulting in three separate language groups is relevant to Northwest Coast prehistory because two of the three language groups are found here. If the putative Na-Dene language family is a separate migration from the Clovis migration (Amerind languages), that might result in two distinct early Northwest Coast archaeological cultures. As we will show later in this chapter, two such distinct cultures are found, and one of them has been previously associated with the Na-Dene, thus giving additional support to the tripartite model.

The second basic question about the peopling of the Americas is how, and this too, is not very controversial, at least in part. The Bering Strait, which today separates northeast Asia from western Alaska, is relatively shallow, and when the sea level lowers, it becomes a broad plain up to 1500 km wide (Figure 4-1). Many mammals have crossed over it in both directions. These include the horse and camels traveling from North America to Asia, and the bison, mammoth, and wapiti (elk), moving from the Old World to the New. So the Bering Strait land bridge—now usually combined with the interior unglaciated portions of Alaska and the Yukon and called Beringia—has served as an effective way to transmit mammals, including humans, from one continent to the other.

Periods of extensive glaciation are times of lowered sea level. When the sea level is 46 m or more lower than it is today, a land connection exists in the present Bering Strait. If the sea level is lowered 100 m or more, a very broad plain is formed between Asia and North America (Figure 4-1). This process has occurred many times in the last two million years, most recently at the end of the Pleistocene. Answering the who and how questions leads us to the most controversial aspect of the peopling of the New World, when it first occurred.

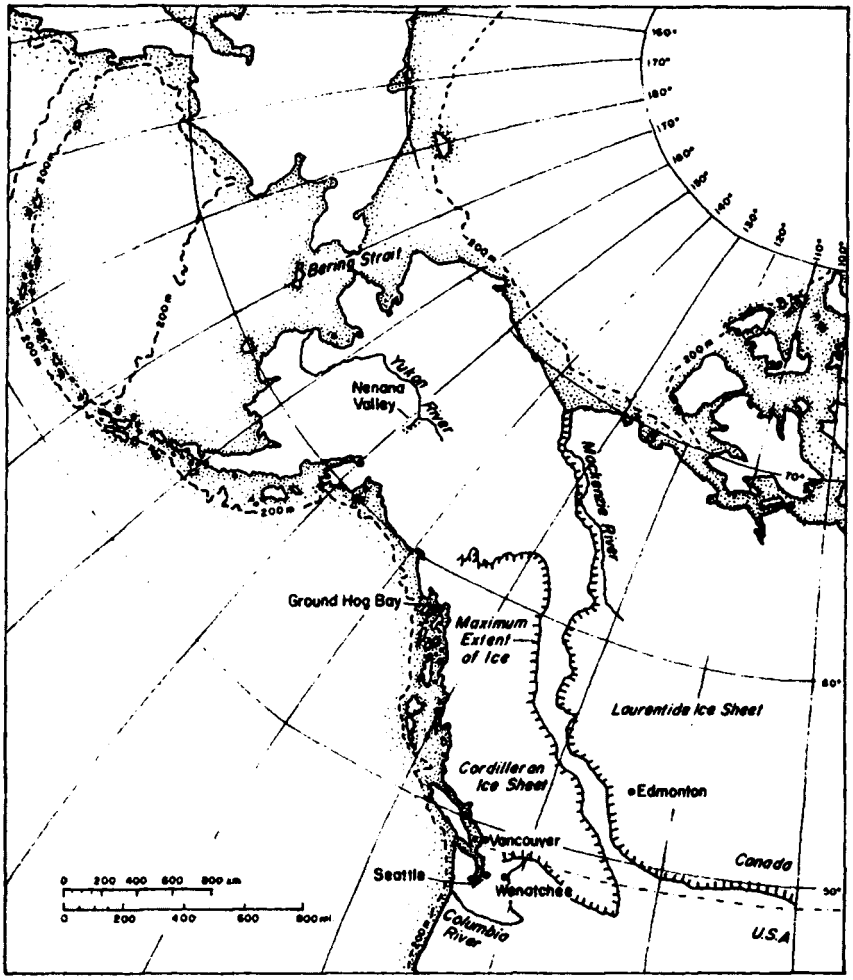


FIGURE 4-1 Northwest North America and the ice-free corridor ca. 15,000 BP. (After Mandryk, 1992).

There are several lines of evidence that set limits to the time period of interest that are independent of, but in agreement with, the archaeological evidence in North America and Siberia. First, all New World human remains are fully *Homo sapiens sapiens.* This limits the time to the last 100,000 years or so. Turner (1985, p. 36–37) points to a further limit of the last 20,000 years or so because the Sinodonty, the apparent ancestral Asian dental pattern, is not found until then, although the current archaeological record there is sketchy. Second, the evidence in Old World indicates that

adaptations that allowed humans to live north of approximately 60° north latitude were not devised until 30,000 years ago or so (Jelinek, 1992; Muller-Beck, 1982). It was only then that humans had fitted clothing and other technological advances that allowed them to survive in colder climates. The temperature varied significantly during the last glaciation and the times that the land bridge existed were those with more glaciers and colder temperatures. So, warm, fitted clothing would have been essential to migrants to North America.

The European Upper Paleolithic is much better known than the Asian Upper Paleolithic, but it is from the latter that the first New World inhabitants descended. Current evidence indicates a lag in development in Asia, with cold adaptations occurring first in the west, but the archaeological record in Siberia is too poorly known for this to be very certain.

Given that humans crossed over sometime in the last 30,000 years, when within this period was this possible? Hopkins (1982), in his review of late Pleistocene sea-level changes, shows a land bridge existing from 25,000 to 13,000 years ago, but during no other extensive period between 70,000 and 25,000 BP. Maximum sea-level depression in the last 70,000 years was on the order of 120 m at circa 18,000 BP, creating an enormous plain. The nature of this plain, in terms of annual natural productivity and resulting large animal biomass, unfortunately, is disputed (Hopkins *et al.*, 1982). Hoffecker *et al.* (1993:46) report on more recent information that indicates that the land bridge remained open at least until 11,000 BP, and quite possibly, until 10,000 BP. From this information we can conservatively conclude that the land bridge was open for cold-adapted humans from 25,000 BP until at least 11,000 BP, and that the "bridge" usually consisted of a large plain, albeit one whose animal biomass is unclear.

If we look at New World, the earliest uncontested cultural material is the Llano Complex, better known as the Clovis culture. This material has traditionally been dated to between 11,500 and 11,000 BP (Haynes, 1982, 1987), although reanalysis indicates that most dates lie between 11,200 and 10,900 BP (Haynes, 1987:84). The Clovis Complex consists of the well-known fluted projectile points, a prismatic blade technology, scrapers, burins, and the occasional bone or ivory tool (Figure 4-2C). These remains are frequently found in association with mammoths, an extinct form of elephant. Haynes (1987:85,86) lists nine traits in common between eastern European Upper Paleolithic and Clovis: large prismatic blades, end scrapers, burins, shaft wrenches, cylindrical bone points, knapped bone, unifacial flake tools, red ocher, and circumferentially chopped tusks. In short, Clovis is clearly an Upper Paleolithic derived culture (Jelinek, 1992), associated with mammoths, and other extinct, late Pleistocene, large mammals. As this kind of Upper Paleolithic culture had only developed in Europe in the last 30,000 years, Clovis origins must be seen as occurring

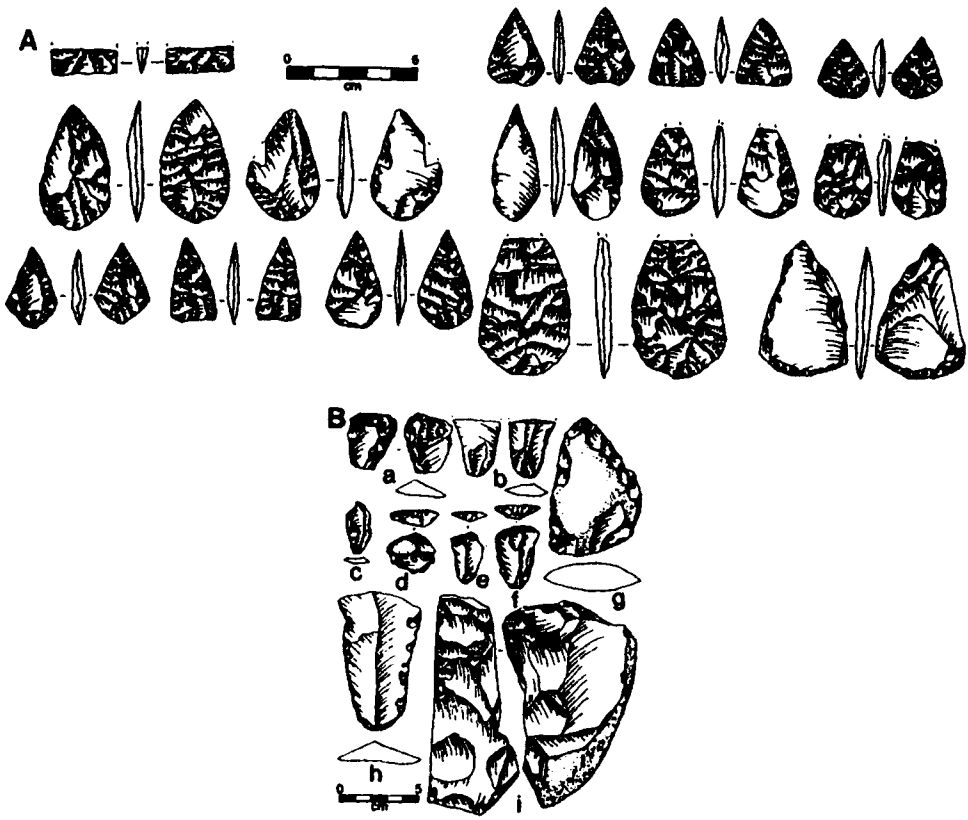


FIGURE 4-2 Early North American lithic cultures. (A) Nenana Complex, bifacially retouched artifacts. (B) Nenana Complex: (a) pièce esquillée; (b, h) retouched blades; (c) graver; (d, e, f) end scrapers; (g) side scraper; (i) plane. (C) Clovis Complex: (a, b, f) retouched blades; (c) oval biface; (d) perforator; (e) lanceolate biface; (g, h, i) Clovis fluted points. (D) Clovis Complex: (a) angle scraper; (b and d–f) end scrapers on blades; (g) spurred end scraper; (c) double-convex side scraper. (E) Denali Complex: (a, b, c) bifaces; (d, e, f) burins; (g, h) microblades; (i, j) wedge-shaped microcores; (k) retouched flake; (l) side scraper. (A, B, and E from Hoffecker *et al.*, 1993; C and D from Goebel *et al.*, 1991.)

within that period, in broad agreement with the other indirect information cited earlier.

The Clovis culture is now known from several dozen sites, spread from the Arizona–Mexico border to the western half of Washington state, and, depending on one's definition of Clovis, to Debert, Nova Scotia. In short, Clovis is found throughout North America, south of the continental ice sheets at the end of the Pleistocene.

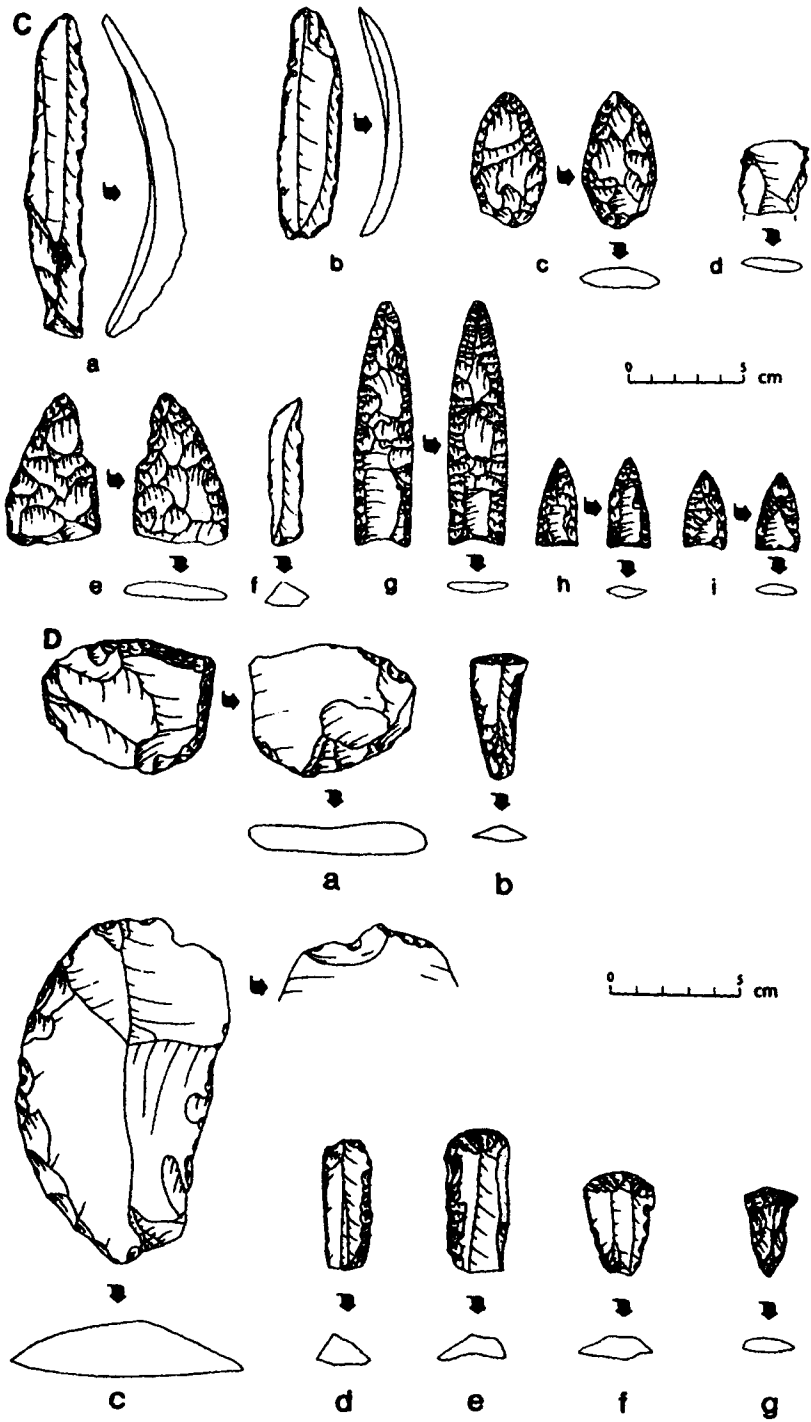


FIGURE 4-2 (*Continued*)

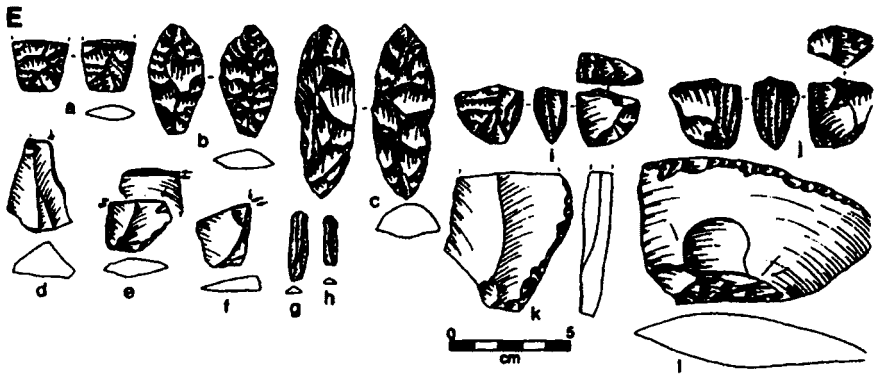


FIGURE 4-2 (*Continued*)

The most direct model for the peopling of the Americas is for an Asian group with a European-type Upper Paleolithic technology to be at the western edge of Beringia at about 15,000 BP, and to move out into this large plain. One might note that there is no necessity for a group to purposely move across Beringia to unglaciated central Alaska. This would happen as the sea level rose if a group was trapped on the eastern side of the developing Bering Strait. Sometime in the period 14,000 to 11,500 BP, the descendants of this group would move south along the eastern flanks of the Rockies, in the "Ice-Free Corridor" (Figure 4-1), between the Laurentide continental glacial ice sheet and the Cordilleran glaciers, which covered most of British Columbia (Mathews, 1979, 1980; Mandryk, 1992). Sometime during this migration or soon after, the distinctive Clovis point was developed, because it is not known in western Canada and Alaska. On arriving on the northern high plains, south of the glaciation in what is currently the United States, the Clovis people found large mammals previously unexposed to human predation. Human exploitation of this rich and unwary resource base provided for a human population explosion and motivation for moving further south. By 10,500 BP humans had travelled all the way to the southern tip of South America.

Such is the conventional wisdom for the "Peopling of the New World." What is the support for this view in the archaeology north of the ice-free corridor in Alaska and in Siberia?

Powers and Hoffecker (1989) have reported on a possible Clovis antecedant—the Nenana Complex—found in interior Alaska (Figure 4-1). This culture is found stratigraphically beneath material—the Denali Complex

discussed later this chapter—known to date between 10,700 and 9000 BP at a number of sites. The Nenana Complex has a large number of radiocarbon dates greater than 11,000 BP associated with it. One site, Walker Road, has four 11,000 plus dates (11,010 ± 200 [AA 1683], 11,170 ± 180 [AA 1681], 11,300 ± 120 [AA 2264], and 11,820 ± 200 [Beta 11254] BP, Hoffecker and Powers, 1989:270) and another, Broken Mammoth, has five (11,040 ± 260, 11,280 ± 190, 11,510 ± 120, 11,770 ± 210, and 11,770 ± 220 BP, Hoffecker *et al.*, 1993:48). Nenana Complex material is now known from at least five sites, Dry Creek, Moose Creek, and Chugwater in addition to the two mentioned above. These sites are concentrated in the Nenana Valley, southwest of Fairbanks (Figure 4-1). Although the assemblages associated with this complex are small, several broken projectile points are present, lanceolate in shape with indented bases although not fluted. Large and small prismatic blades, but no microblades are found in these components (Figure 4-2A, B). Tools made on prismatic blades include end and side scrapers. The Nenana Complex appears to be at least as old as Clovis, shares an Upper Paleolithic ancestry with Clovis, and is likely either the culture that gave rise to Clovis or a late variant of the Clovis ancestral culture.

> We have chosen to use the convention of "BP" to indicate uncalibrated radiocarbon dates in years before present, with present being AD 1950. Because in this work almost all dates are radiocarbon dates, calibration to compare with other means of dating is unnecessary. As calibration techniques continue to improve, one must cite the original radiocarbon dates in order to use new and improved calibration schemes, adding another layer of potential confusion. Because almost all dates are based on radiocarbon estimates in Northwest Coast prehistory, the relative positioning remains the same whether they are calibrated or not.
>
> Radiocarbon dates can be averaged, weighting each one in inverse to the plus-or-minus factor (sigma). In this case we have chosen the method described by Berry (1982), which indicates that the date of the Nenana Complex site Walker Road is really about 11,311 ± 82 BP radiocarbon years ago, if all four dates are of the same event. Use of the F test, also suggested by Berry (1982) and Long and Rippeteau (1974), to try to discern if the four dates are of the same event is invalid, as sigmas are all not within 10% of each other (Long and Rippeteau, 1974:210). Likewise, the averaged date for Broken Mammoth is 11,496 ± 80 BP, and for all nine Nenana Complex dates, 11,405 ± 57 BP. Note that all three sets of averaged dates are older than the 11,200–10,900 BP temporal band of well-dated Clovis sites cited by Haynes (1987, 1991).

A technical analysis of the Nenana Complex has been completed by Goebel *et al.* (1991), who compared the Dry Creek and Walker Road Nenana Complex components with two Clovis assemblages and the Denali microblade material from a later component at Dry Creek. This careful

lithic analysis used 77 tool categories, cumulative diagrams, and cluster analysis to carry out the comparison. The two Nenana assemblages were closely linked with the two Clovis assemblages from Murray Springs and Blackwater Draw, which are many thousand kilometers away, but were quite distinct from the Denali Complex, even though the Denali assemblage was from the same site as one of the Nenana assemblages! This detailed lithic analysis supports the idea that the Nenana Complex is closely related to Clovis, really only differing in lacking the distinctive Clovis point. The dating, general Upper Paleolithic-derived technology, location, and detailed lithic analysis are all in agreement with the interpretation that the Nenana Complex is closely related to the Clovis progenitor.

Haynes (1987) has noted that no mammoth remains younger than 15,000 BP have been dated in Alaska, which may mean that the idea of hunters chasing mammoths across Beringia and then south may be wrong. It may be that it had been thousands of years since the ancestors of Clovis had seen any members of the elephant family. If, as often thought, the Clovis point was developed for mammoth hunting, the absence of mammoths would explain the lack of this style of projectile point in Alaska.

There are always potential pre-Clovis sites. Meltzer (1989) suggests that the life of a pre-Clovis site is about 10 years, before it is finally rejected. At the time of writing, the two most talked about pre-Clovis sites are the Meadowcroft Rockshelter (Adovasio *et al.*, 1983) and Monte Verde (Dillehay, 1984, 1989). There are no questions about the artifacts at Meadowcroft, and the oldest cultural material is "only" 14,000 BP, which would not change the conventional picture very much. There are, however, also serious questions about the dating, which apparently cannot be resolved (Haynes, 1987; Tankersley and Munson, 1992; Adovasio *et al.*, 1992). The material found there, though, appears to be broadly similar to Clovis, but occurs within a very compressed stratigraphy, where minor intermixing would change the dates greatly. Monte Verde, (Dillehay, 1984, 1989) in Chile, is inherently unlikely, in suggesting an "Archaic" life way earlier than any in the Old World. The artifacts associated with this site are very dubious (Lynch, 1990). Of course, being in Chile, it is not immediately accessible to other North American field archaeologists. We expect that Monte Verde will eventually be rejected as more information becomes available, and we hope that Meadowcroft will eventually have its dates clarified. We also expect that other pre-Clovis contenders will arise.

In, or adjacent to, the Northwest Coast are two former pre-Clovis contenders. The first, the Pasika Complex (Borden, 1968b), is a cobble tool industry along the Fraser River, approximately 150 km inland. It is a post-Pleistocene culture, as this is an area that was covered with ice until about 12,000 BP, and has now been indirectly dated to less than 9000 BP (Irvine, 1973; Haley, 1983). Of more fame, is the ill-fated Old Crow Yukon bone tool culture. This research attempt never located a site, and was initiated

by the radiocarbon dating of an artifact type thought to be less than 3000 years old, a caribou scraper. The original radiocarbon date using the mineral fraction yielded a date of 27,000 BP, but recent redating using AMS dating on the collagen fraction yielded a date of 1350 BP (Nelson *et al.*, 1986). Although the Porcupine River area in the Yukon was unglaciated during the Pleistocene, most of the supposed bone tools were found in glacial lake sediments, an unlikely place for the remains of human activities. In spite of a large amount of money and a lot of hard work, the results of intensive investigations in the Yukon revealed no sites with probable pre-Clovis material.

Given that a single, well-dated site, either described in detail or visited during excavation by a group of "skeptics" (as was the original Folsom find in 1927) would overturn Clovis's position as the first New World culture (Meltzer, 1989; Jelinek, 1992), why has such a site not been discovered? An easy answer to this question is that such material does not exist. As J. Peter White remarked at the Pacific Sciences Conference in Vancouver in 1975, in Australia the antiquity of humans there had been increasing on the average of 1000 years for every year since the first relatively old find was verified in 1958. In the New World situation, Folsom was the first culture found in association with extinct animals and verified in 1927; Clovis was found in 1933 (Meltzer, 1989), and no older complex has been widely accepted since then, unless the Nenana Complex qualifies. Even the Nenana Complex fits the White model, as once one site was found and dated, a number of others were found. Of course, there may have been some kind of adaptation not easily recognized by archaeologists prior to Clovis, but this is becoming increasingly unlikely.

ROUTES FOR EARLY HUMAN COLONIZATION OF THE NORTHWEST COAST

The Ice-Free Corridor

To understand the early human colonization of the Northwest Coast, conventional wisdom has it that one must discover how Clovis, the earliest New World archaeological culture, came to be south of the Cordilleran ice fields at the end of the Pleistocene. As mentioned previously, the so-called ice-free corridor, paralleling the eastern slopes of the Rocky Mountains, is the route most frequently mentioned from the unglaciated interiors of Alaska and the Yukon (Figure 4-1). At this time (15,000–12,000 BP) interior British Columbia was heavily glaciated, and the glaciers reached their maximum advance position about 50 km south of Seattle (Fladmark, 1983:19).

The Cordilleran ice sheet was over 1200 m thick in places. East of the Cordilleran ice sheet, the large continental Laurentide glacier covers the prairies east of the Rocky Mountains.

The environmental situation between the Peace River area, on the border between British Columbia and Alberta, and the central Yukon, some 600 km to the north, an area that was never glaciated during the Wisconsinan, has finally become clear (Figure 4-1). According to Mandryk (1992), recent work indicates that from the Peace River north, the glaciers never coalesced during the late Wisconsinan (the last New World glacial advance), thus leaving an ice-free corridor open from the unglaciated interior Yukon and Alaska regions to the Peace River area. Mandryk also reports on recent work reinvestigating the Peace River area, first studied by Mathews (1980). This area has been recently studied by Liverman (1989a, 1989b), Bobrowskey (1988, 1989), and Liverman *et al.*, (1989) [all authors cited by Mandryk, 1992], all of whom have found no evidence for glacial coalescence during the Wisconsin Glaciation.

The Peace River area (Mathews, 1980) may, however, have been covered with glacial lakes. White *et al.* (1985) have shown that the Peace River area had sage, willow, grass and poplar in lake deposits dated at 11,700 ± 260 BP, suggesting an environment that would support game animals by 12,000 BP, or very shortly thereafter. In the same Peace River area, Fladmark *et al.* (1988) have reported on a small assemblage at Charlie Lake Cave, which has bone collagen dates of 10,450 ± 150 (SFU 300) and 10,770 ± 120 BP (SFU 454) from modified bison bone, and includes a small, triangular fluted point. This site attests to the livability of this area shortly after Clovis times. There is also a slight chance that these dates are too recent, and that this site actually represents the proto-Clovis migration through this area. More recent work has been carried out at this site and should clarify this situation.

There is, then, today, no certain evidence that the ice-free corridor was closed anywhere by ice during the Late Wisconsinan. Recent work by geologists tends to show less ice and earlier reduction of ice than allowed by previous investigators, who admittedly, had much less data on which to base their generalizations. With convincing evidence that the ice-free corridor stayed open during the late Wisconsinan, or at least opened shortly after the peak of the ice advance, the attention in this area has turned to the suitability of the environment to support human populations, a quest to which we turn next.

Mandryk's (1992) position is, sensibly, that being open is not enough; the corridor must provide an environment that would support Upper Paleolithic adapted humans. From her pollen analyses of three ponds and her review of other such analyses, she contends that at the height of the late Wisconsin at 18,000 BP, the corridor was a very sparse *Artemisia* dry steppe

and that there would not be enough biomass to support any human population. In her analysis, she estimates that the maximum range for a hunting-and-gathering group is 2500 sq. km, and that such an area could not have supported the average-sized group until 13,000 BP. Hunting-and-gathering groups usually do not have a density near the full carrying capacity (i.e., it would not be until more than a single group could be supported in 2500 sq. km that one would expect to find people). She argues that not until 12,000 BP would people be present, given the slowly evolving environment, wasting ice, and so forth.

In Mandryk's (1992) estimates there is a large jump in mammalian biomass from 14,000 to 13,000 BP; one of the two largest increases charted. Given that her modeling was based on groups being static rather than in motion down the corridor, one can see that a successful migration wave could have a much higher momentary population density, as it procures not the annual biomass produced at the "front" but many years of accumulated biomass, while spawning an occasional static group behind the moving front. Thus, Mandryk's (1992) analysis indicates a migration through the corridor would be feasible 1000–2000 years before the corridor could support static, permanent groups.

Such a movement after 15,000 BP is well within the known capabilities of Upper Paleolithic derived hunters, given that there were enough animals and fuel to support them. No undocumented temperate climate coastal adaptation, arctic, or well-developed seafaring abilities need to be hypothesized according to the present evidence in the ice free corridor.

Given the well-dated Clovis site at East Wenatchee, Washington (Mehringer and Foit, 1990), the makers of the Clovis material had presumably passed through the corridor prior to 11,200 BP and expanded along the southern edge of the Cordilleran glaciation at least to the coast range (East Wenatchee). The earliest use of the coast south of the glaciated areas (Seattle and points south) was undoubtedly by Clovis people and their descendants. When the conditions in British Columbia improved as the ice melted, northward movement up the coast became feasible. This Clovis descendant population is not the only possibility, however, for the first occupation of the northern Northwest Coast.

Direct Route from Alaska

Carlson (1990b) has suggested that the first inhabitants on the Northwest Coast may not have been descendants of the Clovis Culture, traveling up from the south, but instead may have been a premicroblade, biface-using people moving down the coast from Alaska. It is certainly possible that a variant of the Nenana Complex moved from the Alaskan interior to the coast and became the first people to utilize the Northwest Coast.

This hypothesis receives possible support from two early site components along the northern Northwest Coast. At Ground Hog Bay in southeastern Alaska (Figure 4-3), Ackerman *et al.* (1979:198–200) recovered a microblade assemblage from Component II, assignable to what we call the North Coast Microblade Tradition, and dating between 8800 and 4100 BP. This, however, was not the earliest material at this site. An earlier assemblage, denoted Component III, has one of the earliest radiocarbon dates from anywhere on the Northwest Coast—10,180 ± 800 BP (WSU 412). The other dates from Component III are 9130 ± 130 (I-6304) and 9220 ± 80 BP (SI2112) (Ackerman *et al.*, 1979). These three dates have an average of 9202 ± 68 BP. Component III includes two obsidian biface fragments, a water-rolled chert scraper, and flakes of andesite and argillite; microblades and microcores were not recovered. Ground Hog Bay is about 900 km from the Nenana Valley. The Component III assemblage is very small, and it may be premature to suggest affiliation with the Nenana Complex but the possibility should be considered.

A similar but somewhat more confusing situation exists some 800 km further south on the British Columbia coast at Namu (Figure 4-3). A well-defined microblade assemblage was recovered from the middle and upper levels of zone II, dated between 8000 and 5000 BP (Carlson, 1979:214). The lowest levels of zone II were previously reported to contain a few microblades (Carlson, 1983a:91), but these are now said to be absent (Carlson, 1991a). The lowest material (Zone IIa) consists mainly of pebble tools, bifaces, and flakes. This material dates between 9700 and 8000 BP (Carlson, 1983a:91, 1991a), and has been identified as a Pebble Tool Tradition component (Carlson, 1983a:88, 1990b:64). This component remains to be fully described, so we cannot be very definite about its makeup, but it might be considered a descendant of the Nenana Complex.

If these early north coast components are Nenana Complex related, then it may be feasible to suggest a migration route from interior Alaska on to the Northwest Coast, as the Cordilleran ice of the Late Wisconsinan was retreating parallel with a migration down the ice free corridor. In fact, both routes—direct and inland ice-free corridor—may have been taken by populations ancestral to early inhabitants of the Northwest Coast. At this point, though, we know the ancestors of Clovis must have cleared the ice free corridor prior to 11,200 BP, and that there is no good evidence for a direct migration to the Northwest Coast prior to 10,000 BP.

Coastal Route

Fladmark (1975, 1979, 1983) has raised the possibility of a late Pleistocene coastal migration route for the early occupants of the Northwest. In this model, maritime-adapted cultures with boats would have moved through the south coastal areas of Beringia and on to the Northwest Coast

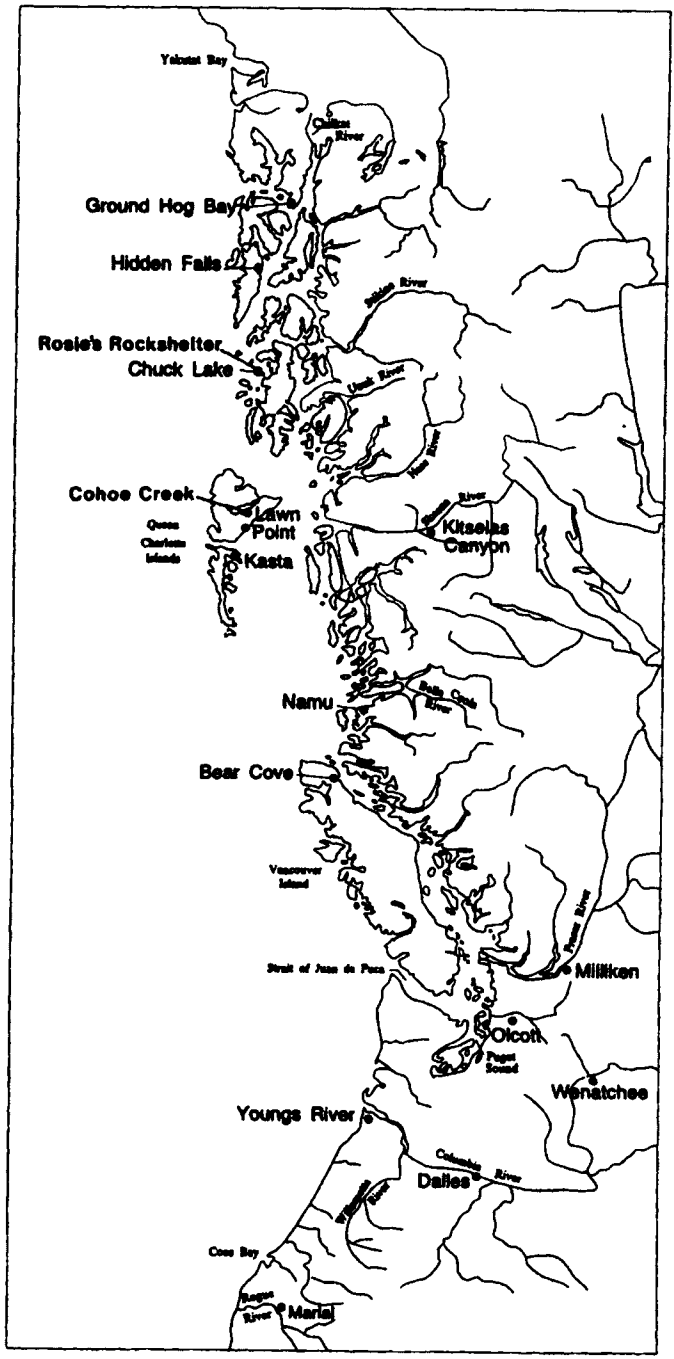


FIGURE 4-3 Early Northwest Coast sites.

before 12,000 BP, perhaps moving rapidly south until they arrived in unglaciated areas where permanent settlement could be established. Fladmark (1983:25) suggests that scattered ice-free areas ("refugia") may have existed along the north Pacific coast even during the late Wisconsinan climax. He asserts that unglaciated islands, coastal headlands, and exposed low-gradient strand flats would possess sufficient marine and tidal resources to support human populations (Fladmark, 1979, 1983:26). R. Carlson (1983a) has suggested that his Pebble Tool Tradition, which is discussed later in this chapter, could have reached the Northwest Coast this way from Asia.

The coastal migration model has been disputed by some professional Pleistocene geologists (e.g., Mathews, 1979) who argue that a virtually unbroken ice front in contact with sea water existed during the height of the late Wisconsinan maximum from the Gulf of Alaska to Vancouver Island. Furthermore, according to Mathews (1979:150), benthic fauna of the shore zone, such as shellfish, were eradicated during the climax glacial period, and the food sources of any refugia that may have existed would have been meager, a position in agreement with the evidence reviewed in Scudder and Gessler (1989).

A study by Blaise *et al.* (1990) indicates that the glacial maximum along the British Columbia coast occurred prior to 15,000 BP, when nearly the entire continental shelf extending out to the Queen Charlotte Islands was filled with ice. Ice filled large areas of Hecate Strait and Dixon Entrance by 23–21,000 BP. At maximum extent, over 600 km of continuous ice may have formed the shore off British Columbia. Between approximately 15,000 and 13,000 BP, the glaciers retreated inland off the continental shelf, resulting in heavy sedimentation further offshore, which Blaise *et al.* (1990) interpret as material being rafted out on ice floes. It was not until approximately 11,000 BP that the glaciers had retreated up the fjords, making most of the coast ice free. This retreat would result in a coastal environment similar to that today on the northern Alaskan Panhandle, where we find the heads of fjords are closed by glaciers. If these researchers are correct—and they do present a convincing case—it appears that the coastal route was impassible between 21,000 and 13,000 BP.

It may be that after the late Wisconsinan climax, perhaps by 13,000–11,000 BP, the coastal route was passable, but it would have presented migrants with an uninviting and inhospitable environment. If this reconstruction is correct, the environment at 13,000–11,000 BP was similar to that seen today on northwestern Greenland, a region too hostile for regular travel by historic Eskimo, which resulted in the isolation of the Polar Eskimos. As far as we know, no capability of the sort seen among historic Eskimo was known prior to the last several thousand years, and it was certainly not present 12,000–14,000 years ago.

More importantly, if there is no pre-Clovis material south of the ice sheets, there is no reason to postulate such an implausible scenario as a pre-13,000 BP coastal migration. Furthermore, such a coastal model is not easy to test; any evidence for such a route would be located close to the sea levels existing at the time of the migration, well under water today. The current evidence for the feasibility of the coastal route contrasts markedly with that for the ice-free corridor.

Having considered the arrival of human populations on the Northwest Coast, and their possible cultural antecedents, we now examine the first two well-attested early Northwest Coast cultures. The first, the Protowestern Tradition, is apparently derived from the Clovis tradition, although at least one culture lies between Clovis and the first known coastal cultures. The second, that of the North Coast Microblade Tradition, briefly introduced above, appears to be a direct descendant of the Denali Complex, which we will address briefly.

THE DENALI COMPLEX

We have already referred to the Denali Complex—an early microblade culture known from interior Alaska—in our discussions of the Clovis Complex. The Denali Complex is important because it appears to be ancestral to an early culture on the north coast of our culture area and because it has been associated with the second of the three migrations postulated by Greenberg (1987), Turner (1985), Borden (1969, 1975) and others. Unfortunately, this complex has also been linked with Clovis, and postulation that Denali Complex was the basal New World culture, because for many years it was the oldest material known in Alaska.

The Denali Complex, also called Paleo-arctic tradition, is a well-known microblade culture. It is distinctive in the presence of microblades, small (less than 3 cm) prismatic blades, usually struck off wedge-shaped cores (Figure 4-2E). Although reasonably ancient, it dates no older than 10,700 BP, with typical dates ranging between 9000 and 7000 BP (West, 1981; Powers and Hoffecker, 1989; Hoffecker *et al.*, 1993). Thus, this cannot be pre-Clovis material, but it has been associated with the proposed Na-Dene–Athapaskan migration (Borden, 1969).

The Denali Complex is found in central Alaska in the Yukon River drainage (Hadleigh-West, 1967), and in the Nenana Valley, as noted earlier. The Denali Complex includes (Figure 4-2E) wedge-shaped cores, burins, and large and small bifaces (Clark, 1981:114). Key sites and site locations include the Campus Site, Donnelly Ridge, and the Dry Creek Site. The Dry Creek Site has the often-cited date of 10,690 ± 250 BP (SI-1561) on a paleosol which is the earliest from a microblade component in North

America (Clark, 1981:114), although Powers and Hoffecker (1989) also report a date of 9,340 ± 195 BP (SI-2329) for the same component but from a higher paleosol. A report (Mobley, 1991) on the Campus Site, however, suggests that it does not belong to the Denali Complex.

Perhaps because of the distinctiveness of microblade technology and because the distribution of microblades in North America is limited mainly to the far northwest, the origins of this tradition has long been relatively clear. Nelson (1937) was the first to note essential similarities between microblade assemblages in northeast Asia and Alaska.

Perhaps the best known Siberian material is the Dyuktai complex (Mochanov, 1980). This material is some distance (2000 km) from the Bering Strait and includes microblades and extinct forms of bison and mammoths. Mochanov (1980) argues it is as old as 30,000 BP, but Yi and Clark (1985) argue that there is no good evidence for it being older than about 18,000 BP. Attempts to view Dyuktai as a precursor to Clovis have been fruitless. First, microblades are not found in Clovis. Second, microblades are not found anywhere else in the world until about 15,000 BP, which leads to doubts about the dating of the Dyuktai complex. It is, though, a very good candidate for the origin of the Denali Complex.

In summary, although good Siberian antecedents for the Clovis culture are missing, recent work in Alaska has resulted in the discovery of the Nenana Complex, which is closely related to Clovis, and may be representative of the culture that gave rise to Clovis. The current evidence, then, is in support with the long-established conventional wisdom for the peopling of the New World. The Denali Complex, following closely after the Nenana Complex in Alaska, has clear microblade antecedants in Asia, and is well placed to be the archaeological manifestation of the postulated Na-Dene–Athapaskan migration.

THE INITIAL OCCUPATION OF SOUTH AND CENTRAL COASTS

The Protowestern Tradition

Protowestern is a term coined by Borden (1969) to distinguish the early archaeological material found west of the Rockies from the well-known Clovis and Clovis-descendent Paleoindian material to the east. The Protowestern concept also allows for an origin separate from that of the Paleoindian, that is, Clovis and its descendants, such as the Folsom culture found east of the Rocky Mountains. At the time it was proposed, well-attested Clovis sites had not yet been reported west of the Rocky Mountains, and the possibility existed that western archaeological material may have had a separate, non-Clovis origin. The Protowestern tradition includes the San Dieguito complex (Rogers, 1939; Haury, 1975) found from the coast of

southern California to the deserts of Arizona; the closely related Mohave Lake material (Warren, 1967); similar complexes found in central Oregon (Cressman, 1977); and the Lind Coulee (Daugherty, 1956) and Windust Phase material of interior Washington (Rice, 1972).

These Protowestern complexes shared traits such as relatively crude lithic technology, a variety of projectile point styles and "commonly feature large biface knives and leaf-shaped points, scrapers in a wide range of size and type, occasionally crude or even well made blades, but never microblades. Varying quantities of pebble tools are usually present." (Borden, 1969:8) The faunal remains are almost always of presently existing animal species. This last is in contrast with the Clovis and Folsom cultures, which are associated with extinct forms. The general interpretation was that Protowestern cultures were large land mammal hunters, with deer, elk, and antelope being the common prey. Although there was a minority of archaeologists who argued for Clovis or pre-Clovis dates for certain of these sites, no convincing data have emerged, and all well-dated Protowestern sites have been found to be no older than 10,500 BP (Sheppard *et al.*, 1987).

The controversial non-Clovis origin possibilities for the Protowestern tradition now appear to be moribund with the documentation of the East Wenatchee, Washington, Clovis site (Mehringer and Foit, 1990). Although surface finds of Clovis points in the Pacific Northwest have long been known (Osborne, 1956), the East Wenatchee site (Figure 4-3) is both the first well-documented excavated Clovis site west of the Rocky Mountains and the oldest known site in the Pacific Northwest, dating to slightly more than 11,000 years ago (Mehringer and Foit, 1990). The East Wenatchee site confirms Clovis as the basal culture in this area, and validates the undated surface finds of Clovis points in the Northwest (Osborne, 1956; Minor, 1985). Protowestern can now be seen to derive from Clovis and fit in between Clovis and later cultures. Because Wenatchee is less than 150 km from Puget Sound, it is also likely that the first human use of the coast was by Clovis people.

The best known early Protowestern complex is the Windust phase, which we understand as including the closely related Lind Coulee material (Rice, 1972). (R. Carlson [1983a, 1990b] considers the Windust culture to be part of his Stemmed Point Tradition.) The Windust phase is most renown at the Marmes Rockshelter, which at one point was thought to date to Clovis times. Marmes is now known to date "only" to 10,500 BP (Sheppard *et al.*, 1987). A number of sites belonging to this tradition are found in the interior of Washington and continue to at least 9000 years ago (Rice, 1972). No dated Windust phase site is known in British Columbia, or along the coast. The Windust phase has clear links with the Paleoindian tradition, some of which were pointed out by Daugherty (1956:258) and is now conventionally seen as derived from Clovis (Carlson, 1988).

Old Cordilleran Culture

The Old Cordilleran culture is clearly derived from the earlier Protowestern cultures (e.g., Cressman, 1977:136). The Old Cordilleran is distinquished from Windust phase assemblages by the high percentage of leaf-shaped projectile points in the former. Butler (1961, 1965) originally defined the Old Cordilleran and postulated that it may be the basal culture of the Pacific Northwest Coast, which we know today is clearly not the case. Warren (1968) redefined the culture and placed it temporally after the Windust phase (called there Lind Coulee) and beginning no earlier than 9000 years ago, which we accept.

Perhaps because of the earlier suggestions of great antiquity for the Old Cordilleran culture, some archaeologists have argued for the rejection of this term (Nelson, 1969; Bense, 1972). Even these critics, however, admit the existence of a "homogenous, synchronic cultural horizon in the Pacific Northwest with characteristics similar to the Cascade Phase"(Bense, 1972:89). (The Cascade phase is a local manifestation of the Old Cordilleran culture in southeastern Washington.) Given the existence of the pattern—but not the dates cited by Butler—it makes sense to follow Warren and continue to use the term to refer to this "cultural horizon." As we understand it, Old Cordilleran includes such interior manifestations as the Cascade, Vantage (Nelson, 1969), and Indian Well phases, as well as the Olcott material north of Seattle (Bense, 1972:89).

The cultural similarity of the Old Cordilleran culture to the preceding Windust phase is evident in the Marmes Rockshelter, which contains components of both cultures. Rice (1972) classified some layers there as Windust phase that Bense (1972) had classified as the Cascade phase, which demonstrates the close similarity of the two cultures. It is this culture that leaves the first evidence of the use of coastal resources from Vancouver Island south to near the California border. R. Carlson (1983a, 1990b) has referred to this culture when present along the coast as the Pebble Tool Tradition, in recognition of the often abundant pebble tools. R. Carlson (1983a) has offered, in effect, an alternative explanation for the origins of the coastal Old Cordilleran. He suggests that the source could be via a coastal migration from Asia of a pebble tool and biface culture adapted to the coast (R. Carlson, 1983a, p. 90) or from the Nenana Complex via a shorter coastal migration. In the absence of the Protowestern (and the difficulties with an early coastal migration discussed previously) this model might appear plausible. However, it does not make sense for the Protowestern as whole, given the presence of Clovis—with earlier dates—adjacent to the central Northwest Coast. R. Carlson (1988) agrees that the Windust phase variety of Protowestern is most likely a descendant of Clovis. His scenario is plausible only if one views the coastal Old Cordilleran as a dis-

tinct culture from the inland Old Cordilleran, distinguished by abundant cobble tools. Abundant cobble tools, however, also occur in some inland Old Cordilleran manifestations as well; Bense (1972) reports 30% of the large assemblage from site 35CO11 is cobble tools.

Two excavated sites have yielded most of the information we have about coastal adaptation during this period, the Glenrose Cannery site (Matson, 1976) and the Bear Cove site (C. Carlson, 1979). Both of these sites are in British Columbia, in the central Northwest Coast. Glenrose Cannery, the largest and most fully reported site, is found near the city of Vancouver (Figure 4-4).

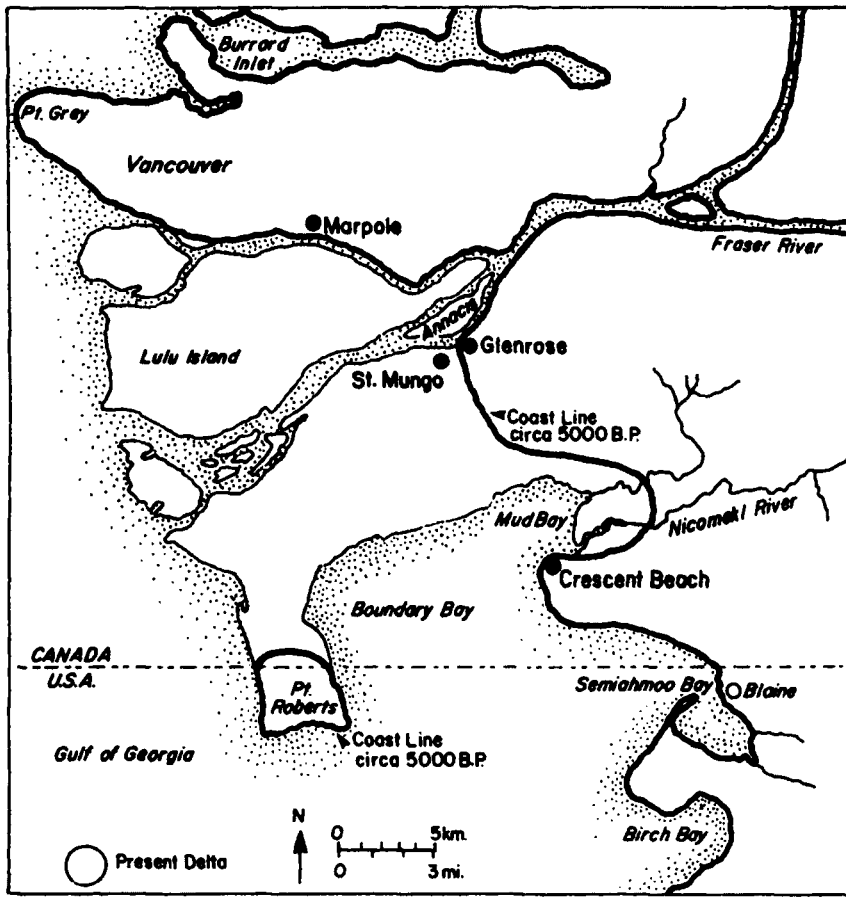


FIGURE 4-4 The Glenrose Cannery and other sites in the Vancouver area. (From Matson, 1992).

The Glenrose Site

The Glenrose Site is situated on the south side of the Fraser River between Annacis Island and Panorama Ridge, which is a highland area (Figures 4-4). When first occupied, Panorama Ridge was probably similar to present Point Grey, a peninsula extending into the Gulf of Georgia, and next to the outlet of the Fraser River, having a pebble beach (Hebda, 1977: 141). The immediate environs of the site have two factors that probably conditioned its use: a more gradual slope of Panorama Ridge than is usual in that general area, and a small freshwater stream that now empties under the Glenrose Cannery buildings.

Some of the cultural deposits are quite deep, with the maximum depth being about 5.5 m in Unit 1, with over 2 m of those being Old Cordilleran deposits. Some 614 classified artifacts (tools) (Figure 4-5) were recovered from the Old Cordilleran Component (Matson, 1976: 292). Five dates were run on samples thought to be from the Old Cordilleran component. Four of these were accepted by Matson (1976) and ranged from 8150 ± 250 (Gak 4866) to 5730 ± 125 (Gak 4650) BP. Because the oldest date was about 1 m above the basal sterile layer, which is only 2 or 3 m above current sea level, the beginning of the occupation is estimated at circa 8500 BP and lasted at least until 5500 BP.

Although these radiocarbon assays date the older portions of this component reasonably securely, they do not date the uppermost layers well. In the original report, Matson (1976) allowed for 1000 years between the Old Cordilleran and the succeeding St. Mungo material, although the lack of evidence for a hiatus of that length was also cited. Matson suggested a terminal date of 5500 BP (1976:19) for this component. Since then, others (F. D. Leonhardy, 1975) have indicated that some local variants of the Old Cordilleran, such as the Cascade phase, existed until approximately 4500 years ago. We do not see any evidence that negates this possibility at Glenrose, and would now suggest that the ending date is between 4500 and 5000 BP (Matson, 1988a).

The vast majority of the artifacts from this component are lithic and can be divided into two categories, cobble tools (44%) and the rest (Figure 4-5). Most of the remainder were flake tools, although leaf-shaped bifaces, both large and small, were also recovered. A few pieces of ground stone were present, as well as relatively abundant antler and bone tools. A number of antler wedges and one barbed point, probably a fixed barbed point rather than a detachable harpoon (Figure 4-5F), were also found. This assemblage is described in more detail in the sidebar and in Figure 4-6.

> Beginning with the cobble tools found in the Old Cordilleran component at Glenrose, 95 (17%) were unifacial chopping tools along with lesser amounts of bifacial choppers and scraper planes (Figure 4-6). Cor-

tex spalls were fairly abundant but they tended to be smaller and less modified than the same class found in later cultures from the British Columbian interior. A total of 32 hammerstones were also recovered.

The leaf-shaped points (Figures 4-5 and 4-6) so typical of the Old Cordilleran are present at Glenrose, though not in very large number; only

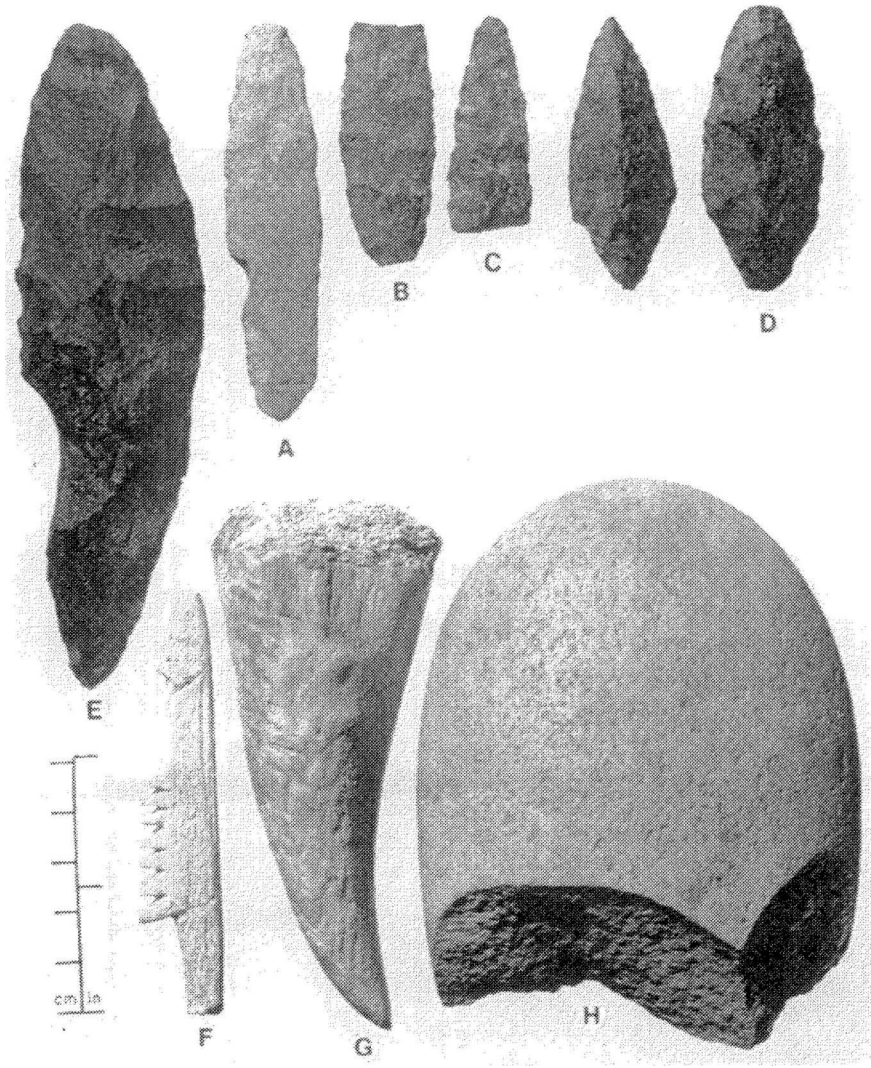


FIGURE 4-5 Old Cordilleran artifacts from Glenrose. (A–C) leaf-shaped points; (D) contracting stem point; (E) large, leaf-shaped biface; (F) barbed antler point; (G) beam antler wedge; (H) cobble tool. (From Carlson, 1990b.)

four complete ones were found (Figure 4-5A,B,C). In addition, one weakly contracting stem point was recovered in the levels attributed to this component (Figure 4-5D). Leaf-shaped knives (Figure 4-5E), along with biface fragments, and large crude bifaces are also represented. As shown in Figure 4-6, unifacially retouched flakes (narrow angle unifaces) and scrapers occurred. However, no endscraper or thumbnail forms were found.

Although many of the noncobble tool numbers appear to be very low, if we remove the cobble tool and core categories, the percentages become closer to the usual expectation for an Archaic or Lithic component (Figure 4-6). Among the bifaces the percentages become 2% projectile points, 2.4% knives, and 2% biface fragments.

A few pieces of ground stone were also found in this component, including three abrasive stones, and four pieces of miscellaneous ground stone. None of the latter fragments could be readily interpreted, but it is certain they did not come from stone tool classes common in later times.

In some ways the tools made of bone and antler are more interesting, because they are relatively rare from deposits of this age. Eleven beam antler wedges were recovered, along with one antler punch and a single

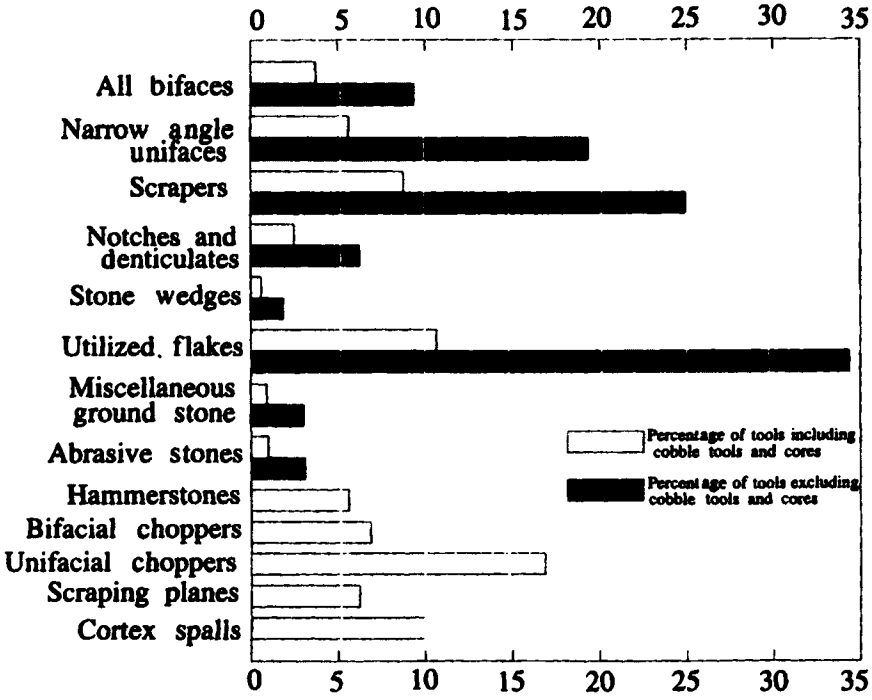


FIGURE 4-6 The Old Cordilleran lithic assemblage from Glenrose. Percentages calculated as percent of all tools excluding cobble tools and cores.

barbed point. The latter (Figure 4-5F) is more likely to be a fixed barbed point rather than a true harpoon, because the barbs are usually spaced further apart on harpoons (Clark, 1975). Among the bone artifacts, three needle point awls, one ulna tool, one bone "blade," and one tooth pendant were found, along with six miscellaneous worked bone fragments.

Turning to the faunal remains, S. Imamoto (1976) identified elements from elk (wapiti), deer, *Canis* sp., beaver, and harbor seal. The most abundant remains were elk and deer, followed by seal. The use of the minimum numbers of individuals (MNI) measure and usable meat estimates indicates that elk was the most important, followed at some distance by deer and seal, which are calculated to have approximately equal importance. These results are in accord with what one would expect from the Old Cordilleran, if it is an adaptation oriented around large land mammals. The presence of seal is not really surprising, given that seals are found today on Harrison Lake, far up the Fraser River. It does, however, demonstrate the inclusion of sea mammals into the hunting pattern. Because both juvenile elk and deer are present, Imamoto inferred a summer occupation for this component at Glenrose.

The fish remains, on the other hand, resulted in unexpected information (Casteel, 1976). Column samples from two units (Figure 4-7A) in-

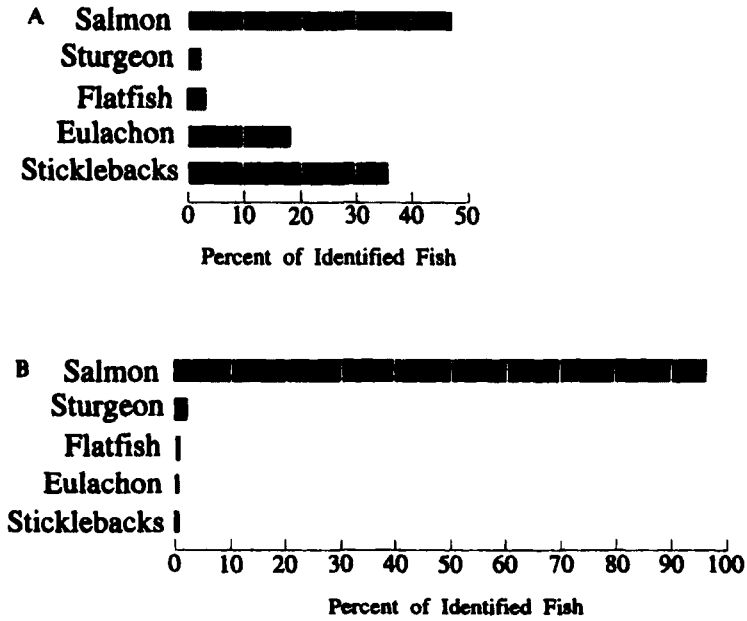


FIGURE 4-7 Old Cordilleran fish remains from Glenrose. (A) average of identified fish from two-column samples; (B) from whole unit sample. (From Casteel, 1976.)

cluded salmon, flatfish (starry flounder), eulachon, stickleback, and one peamouth remains from Old Cordilleran layers. Casteel identified both salmon and sturgeon remains from Unit 1 Old Cordilleran level bags (Figure 4-7B). The eulachon are, of course, well known for their springtime abundance (see sidebar in Chapter 2).

The less well-known sticklebacks are anadromous and begin to become abundant in local freshwater streams by mid-May and continue until early summer. The abundant presence of both sticklebacks and eulachon pinpoint the occupation of this site to the late spring and early summer. The procurement of a wide variety of fish during at least the early spring and summer was also part of the Old Cordilleran component at Glenrose.

Although no bird remains were found at Glenrose, surprising amounts of shellfish were. There were lenses of concentrated shell in the lowest portions of this component, particularly in units 3 and 6 (Figure 4-8). In all cases the shellfish was dominated by bay mussel, which also occurred as small fragments in the deepest units. A single sealed layer at the uppermost portion of the Old Cordilleran deposit in the trench had relatively complete mussels which Ham (1976:66) was able to determine were harvested in spring or early summer (see sidebar, Chapter 5). These shellfish deposits were only a minor constituent of this component, particularly compared to later ones. Shellfish procurement, however, was definitely part of the subsistence pattern in Old Cordilleran times.

The faunal remains show a wide diversity, but indicate a subsistence pattern that was most likely centered on elk, deer, and seal, but with a wide variety of less important fish and shellfish also procured. Most of the fish and shellfish could probably be obtained from the shore, with the starry flounder being a possible exception. The seasonality inferences from the three most sensitive indicators—mussels, eulachon, and sticklebacks—are in agreement, indicating spring and early summer. Although the site may have been occupied at other times, it is clear it was regularly and intensively occupied at this season.

Unfortunately the units with the majority of the faunal remains were not radiocarbon dated. In the absence of direct dates, the only surety is that the faunal and seasonality information is older than 5000 BP. Whether or not any of it is older than, for example, 6000 BP. depends on the interpretation of the site formation processes. If the sterile layer was occupied all at once, then most of this material dates older than 6000 BP.

Bear Cove

A site very similar to Glenrose has been reported by C. Carlson (1979) at Bear Cove at the northern tip of Vancouver Island (Figure 4-3). This site is also located next to a small stream, and the component of interest is located somewhat back from the beach. This Old Cordilleran component is found

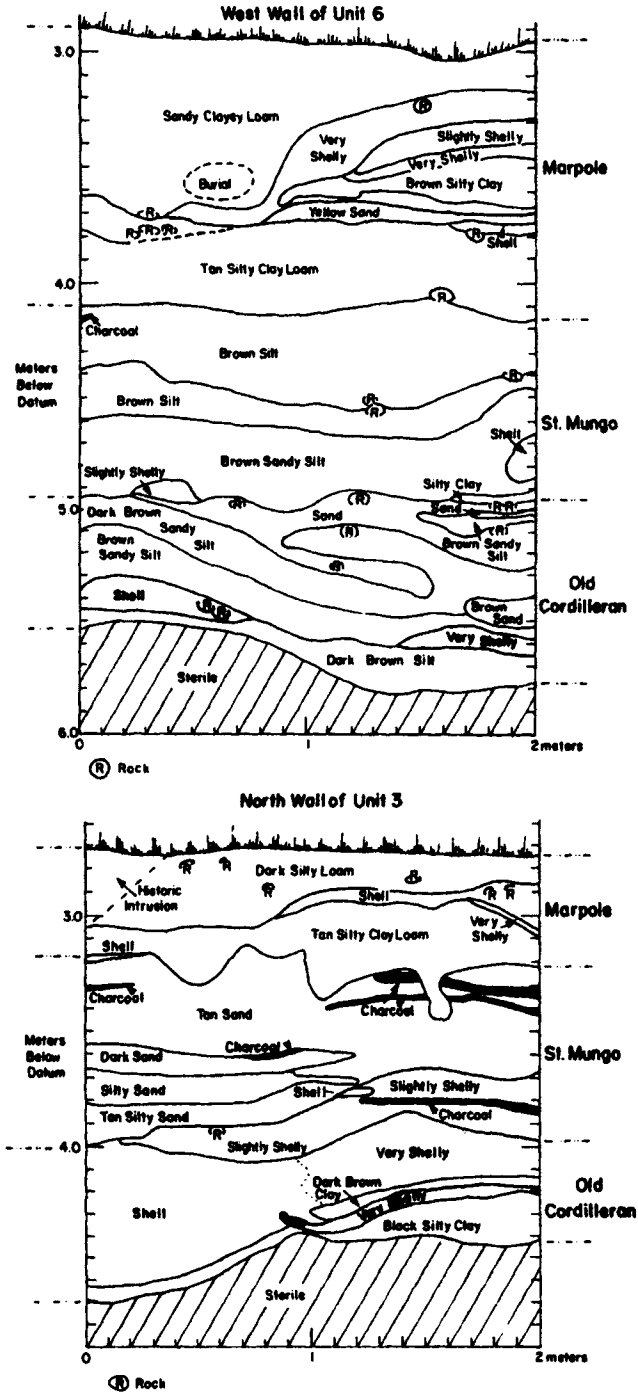


FIGURE 4-8 Concentrated shell layers in the Old Cordilleran (Component III) at Glenrose (From Matson, 1988a.)

underneath a shell midden beginning about 7 to 9 m above present mean sea level in a deposit that includes "poorly stratified silty loams and marine sands and gravel" (C. Carlson, 1979:180). This height above present sea level agrees well with current estimates of mean sea-level height 8000–7000 BP on the north coast, reviewed later in this chapter. The old shell-less deposit varies from 1–1.5 m in depth, and near the bottom produced a radiocarbon date of 8020 ± 110 BP (WSU 2141). The striking similarities with Glenrose of the "beach deposits" and the initial date are reinforced by the initial date of the overlying shell midden, which is estimated on the basis of two 4000 BP radiocarbon dates as around 4300 years ago. Furthermore, water-worn artifacts are found at both sites. A distinctive difference is a black, greasy layer averaging 20 cm in thickness at the top of this component at Bear Cove, just below the shell midden.

Although only 137 tools are assigned to this component, the lithic industry is very similar to that seen at Glenrose, as detailed in the sidebar. Only two worked antler and bone pieces were identified as coming from this component, making a comparison of the nonstone industry difficult.

> The Old Cordilleran Bear Cove lithics are dominated by tools made from pebbles. Cobble tools make up 48% compared to 35% flake or spall tools, 6% bifacially flaked points or knives (including fragments), and 11% miscellaneous tools. The projectile points and point fragments are interpreted as all being from leaf-shaped bifaces, although one illustrated is more of a contracting stem point than the point illustrated in Figure 4-5D from Glenrose (C. Carlson, 1979). Among the miscellaneous artifacts are four hammerstones, three notched stones, and two pieces of bone and antler. Most of the pebble tools are unifacial choppers, also the most abundant category at Glenrose (Figure 4-6). In summary, the lithic industry appears to be very similar to Glenrose, both in kinds of artifacts, their relative abundance, as well as in age.

In contrast with similarities with Glenrose in artifacts and dating, the faunal remains are quite different (C. Carlson, 1979:188). Sea mammal remains, fish, land mammal and bird fauna are all present, although apparently preserved only in the upper portion of this component, in the black greasy layer. The most common identified fish remains were those of rockfish (*Sebastes*) (72%) with salmon representing only 10%. There were also "small quantities of" Pacific cod, pollock, sculpin, greenling, dogfish, and ratfish. These fish can all be obtained in the immediate vicinity of Bear Cove today.

About twice as many mammal bone fragments were recovered as fish, and 78% of those identifiable were from five sea mammal categories. Fully 80% of the sea mammal class were *Delphinidae* (Porpoise), 9% northern fur seal, 7% Stellar sea lion, with the remaining 4% being sea otter and harbor seal. The 22% land mammals are mainly mule deer with a few pieces rep-

resenting *Canis* sp. and river otter. Identified birds include ducks, gulls, loon, and murre.

Unfortunately, the age of this very interesting faunal assemblage is unclear. Like that from Glenrose, it is clearly older than 4500 BP, but, unlike Glenrose, only the uppermost part of this component is represented, as the lower portions did not have any preserved faunal remains.

C. Carlson infers a subsistence pattern of mainly sea mammal hunting, a conclusion with which it is difficult to argue. The porpoises, in contrast with Glenrose seals, do necessitate watercraft and harpoon or equivalent techniques. C. Carlson postulates the existence of a bone and antler technology in this tradition, which is, in fact, well confirmed at Glenrose, especially with the presence of a barbed point.

The excavator interprets this component to be a temporary campsite on an active beach front, an interpretation very similar to that for Glenrose. Although no seasonality analyses have been published, C. Carlson (pers. comm.) informed us that, except for the fur seal, the resources present can be obtained year-round. Thus the actual season of occupation of this site, and the likely role of the site in the annual subsistence pattern is unknown. In the Pacific Northwest, except for herring, almost all traditional seasonality indicators are for seasons other than winter, so the absence of specific seasonal indicators usually means winter occupation.

Together Bear Cove and Glenrose complement each other with very similar lithic assemblages and dates but have very different faunal assemblages. Although Glenrose can be interpreted as a minor seasonal variant on a large land mammal-oriented subsistence pattern, with no necessary specialized maritime adaptation, Bear Cove demonstrates that seasonal variants, at least, of the Old Cordilleran tradition, were subsisting largely on sea mammals, likely obtained from watercraft.

Although Glenrose demonstrates that a wide variety of fish were obtained, many of those could have been caught along the shore or in small streams. The eulachon, sticklebacks, and salmon all could be obtained without getting more than one's feet wet. Only the starry flounder might indicate offshore fishing of sandy bottoms and probably quiet waters. At Bear Cove, rockfish, caught along rockier shores, may also demonstrate a greater level of marine technology, as would the porpoises. In sum, irrespective of the general subsistence pattern there were at least seasonal variants focused on foreshore resources, which included using watercraft and harpoons to obtain porpoises. It is clear, though, that the ethnographic emphasis on salmon fishing is not present at either site at this time.

Other Old Cordilleran Sites

Although subsistence information for coastal Old Cordilleran components is largely limited to that reviewed previously, (and the earlier excavated

Dalles sites, reviewed later) some additional information can be gleaned from similar lithic tool assemblages. In northwestern Washington, surface sites with abundant pebble tools and the occasional leaf-shaped biface are referred to as Olcott. G. Grabert discussed a number of these sites in a paper on pebble tools sites (Grabert, 1979). He reported that assemblages either dominated solely by pebble tools or by pebble tools and bipointed bifaces are found at three locations around Birch Bay, and along the Nooksack River, some 10 km inland from the present coast. The only relevant date is from a site along the Nooksack River, the Ferndale site, which has a minimum date of 4180 ± 120 BP (RL 249) for the termination of this component (Grabert, 1979:169).

Further to the south are the Olcott sites proper (Butler, 1961; Kidd, 1964). They are located well inland, circa 22–24 km, north of Seattle and without a clear association with a coastal adaptation (Figure 4-3). There are actually quite a number of sites in this area that have been surface collected and which have a similar complex of pebble tools, leaf-shaped points and knives, and spall scrapers. These are located along the south fork of the Stillaguamish River. Kidd (1964, pp. 27–91) reports on a number of related inland sites, including the Olcott site itself, all known from unsystematic surface collections and which share the above characteristics. Kidd's work demonstrates that the Olcott pattern is an extensive inland one.

The Olcott material is likely largely Old Cordilleran, but remains unsystematically reported and poorly dated. It also includes material that is not Old Cordilleran. There are, however, Old Cordilleran sites that are well dated up both the Fraser and Columbia rivers.

The best dated British Columbia inland Old Cordilleran component is that at Milliken (Borden, 1960, 1961, 1975) in the Fraser River canyon (Figure 4-3), which was recently reanalyzed by Mitchell and Pokotylo (1988). In their preliminary analysis these authors found that pebble tools comprise 11.8% and 18% of the two Old Cordilleran assemblages found there. These are substantial numbers, but far less than the 44% found at Glenrose and 48% at Bear Cove, and less than that reported by Bense for some Cascade phase sites in southeastern Washington.

As is typical of British Columbian sites without shell middens, no faunal remains are preserved at Milliken. It is, however, located at the entrance to the Fraser canyon, one of the most important salmon fishing locations in the Northwest Coast. Borden (1975) was also able to demonstrate that it was occupied in late summer, the time today when the salmon runs peak. It is more than reasonable, then, to infer salmon fishing at Milliken, in spite of the lack of direct evidence.

Milliken and Glenrose–Bear Cove Old Cordilleran are closely related archaeological manisfestations, as there is very little in the lithic assemblages that is not present in both inland and coastal Old Cordilleran sites.

A more formal comparison was made by Pratt (1988; see also Matson, 1988a) who showed that the major difference in the two areas was in the abundance of pebble tools on the coast.

One wonders what was the use of the pebble tools? Given the abundance of antler wedges in this component at Glenrose, the often suggested use as woodworking tools sound feasible to us, as it has to many others (Grabert, 1979). It is difficult to see why wood processing should be consistently much more important on the coast than in the interior. The wet weather and the relative short duration of occupation of the coastal sites may mean that making temporary wooden shelters with pebble tools was a constant activity for such groups. In another direction, Bordes observed people today using cobble choppers to scrape mussels off rocks. Given the evidence of mussels in parts of Glenrose, this is apt to have been a regular activity, and cobble choppers preserve much better than the actual mussels.

Although the coastal Old Cordilleran is best known from the above sites, there are other sites that bear on our understanding of the coastal adaptations. The best known of these is the Five Miles Rapid locality at the Dalles, located on the Columbia River (Figure 4-3) in an analogous position to that of the Milliken site on the Fraser (Cressman *et al.*, 1960; Cressman, 1977).

> The Five Miles Rapid locality was investigated by Cressman in 1953–1956, and is about 250 km from the Pacific Ocean and 130 km east of Portland, above the Columbia Gorge at the Dalles (Figure 4-3). This is an area ethnographically known for its excellent fishing. Dates ranging back to 9800 BP are reported from the Dalles Roadcut site (Cressman *et al.*, 1960; Cressman, 1977). In levels 20–31 (approximately 7500–9000 BP) large numbers of fish bones (salmon vertebrae) were recovered associated with a chipped stone industry dominated by choppers, leaf-shaped points and knives, lesser numbers of graving tools, burins, "side polishers" (edge ground cobbles) and, finally, bola stones (Cressman *et al.*, 1960, p. 78). This component is very important historically, because it was the first Old Cordilleran manifestation to be well described and dated. Because of changes in archaeology in the last 40 years, though, it is difficult to compare in detail with other Old Cordilleran components, although it appears to be most similar to Milliken.
>
> Interestingly enough, large numbers of bird remains are also found in these levels (cormorants, condors, and bald eagles). One interpretation is that these birds were feeding on spawned out salmon and that the salmon remains were not being exploited by humans. A recent examination of the salmon remains by Butler (1990, 1993) concludes that the remains are cultural, not natural. This site demonstrates the presence of the Old Cordilleran culture at this time and place, and at least seasonal salmon use along the Columbia River.

The Youngs River site has recently been reported at the mouth of the Columbia River (Minor, 1984) and shares a number of attributes with the

Roadcut site. Although unexcavated, surface collections produced leaf-shaped points and knives, as well as bola stones and "baked clay sinkers," demonstrating a close relationship with the Dalles sites. This site indicates that Old Cordilleran people used the coast, at least on a seasonal basis, from the north tip of Vancouver Island to the Columbia River.

Further south, nearly at the southern boundary of the Northwest Coast culture area, along the Rogue River (Figure 4-3), is another Old Cordilleran site (Schreindorfer, 1988). The Marial site is located 80 km upstream from the coast at about 120 m elevation. Today the Rogue River has both coho and chinook salmon runs. This site, then, is in a location similar to that of Milliken or the Dalles, although closer to the coast than either.

According to Schreindorfer (1988) there are three components that would fit our use of the term Old Cordilleran, which have associated radiocarbon dates of 5850 ± 120, 6485 ± 80, and 8560 ± 190 BP (no laboratory numbers given). In the oldest component a total of seven projectile points, all leaf-shaped, were recovered. In the two more recent Old Cordilleran components, 42 out of the 53 points classified are leaf-shaped points. Cobble tools are also abundant, but apparently only in the two later Old Cordilleran components. The artifacts show a high similarity with other Old Cordilleran assemblages, with perhaps the largest difference being the common presence of serrations on the projectile points.

Although the Marial site does not add much information to our understanding of this time period, it does extend the known range of the Old Cordilleran culture. It can now be seen to extend from southern British Columbia to Idaho and down to the California–Oregon border. The Tahkenitch Landing site, located on the coast about 100 km to the north of the Marial site, may be a seasonal variant of this culture.

The Tahkenitch Landing site is located north of Coos Bay on the sand dunes that block the Tahkenitch Lake exit to the ocean (Minor and Toepel, 1986). During the main occupation, 8000–3000 BP, the setting was an open estuary very different from the freshwater lake now filling the valley. The oldest occupation is a sandy, shell-less layer with two radiocarbon dates older than 6000 BP (7960 ± 90 [Beta 14870], 6880 ± 80 [Beta 11202]), but only seven nondiagnostic lithic artifacts. This component does have an extensive fauna associated with it, although only three kinds of identified mammals: 1 harbor seal, 1 sea otter, and 11 rodent elements. Bird remains are more abundant, with 33 elements of unspecified "ducks," 11 of cormorants, and lesser numbers of more specific identifications. Fish remains, on the other hand, are surprisingly abundant, with 155 Staghorn sculpin (*Leptocottus armatus*), 27 probable Starry flounder, 54 surf perch, 81 tomcod, 62 Pacific hake, and 21 herring elements identified. Most of these fish are small and come into estuaries today. The main exception is Pacific hake, which is a large offshore fish, although some records indicate that it is occasionally caught off estuaries today. Herring are found in estuaries in

the summer and fall today. This faunal profile indicates a broadscale fishing and waterfowl procurement system, which would be consistent with a summer utilization of the coast by an Old Cordilleran variant.

Summary

The first known occupation of the central and southern Northwest Coast was the leaf-shaped-biface- and cobble-using Old Cordilleran people. This widespread culture was making use of coastal resources shortly after 9000 BP from the northern tip of Vancouver Island to the southern end of the Northwest Coast. This culture continued up until approximately 4500 BP, lasting at least 4500 years. Examining the Old Cordilleran as a whole, including both coastal and interior variants, the evidence points to a general land mammal hunting orientation, although some use of other, smaller resources is also indicated.

The evidence from Bear Cove, Glenrose, and other coastal Old Cordilleran sites demonstrates a widespread early coastal adaptation of a variant of the Old Cordilleran culture. This may be a seasonal variant of a mainly land mammal adaptation, as Matson argued earlier (1976), or a full-time, year-round adaptation to the coast. The current evidence does demonstrate use of a wide range of coastal and terrestrial resources, although no known site is indicative of much residential duration. Shellfish, flatfish, sticklebacks, eulachon, salmon, sculpin, rockfish, cod, sturgeon, and peamouth are all represented. Salmon are not only seen at Glenrose but also at the Dalles, inferred at Milliken and in other inland sites. Yet the numbers of salmon at Glenrose are small, even smaller at Bear Cove, and absent at Tahkenitch Landing. Besides the obvious land mammals, seals, fur seals, Steller sea lions, and, most amazingly, porpoises were procured. This large number of resources suggests that a wide range of technologies were also known.

Although the surviving lithic technology is not impressive, it may be because these tools were used to make a more sophisticated perishable technology. The presence of numerous antler wedges at Glenrose supports this argument. The known distribution of the Old Cordilleran Culture is inland, but where sites are found along the central and south coasts they belong to this tradition. There does not appear to be any consistent difference in lithic tools between the coast and inland manifestations, in spite of the very different environments, although all known coastal sites have large numbers of pebble tools. This lithic similarity leads back to the inference that the coastal manifestations of the Old Cordilleran are, in the main, variants of a broadscale large mammal hunting adaptation. The Old Cordilleran culture nowhere, neither inland nor along the coast, shows any evidence of residential permanency, or any other deviance from the standard expectations of hunters and gatherers.

THE NORTH COAST MICROBLADE TRADITION

The first clear north coast occupation differs significantly from the Old Cordilleran culture to the south. The North Coast Microblade Tradition extends from the northern Alexander Archipelago of the Alaskan Panhandle to just north of Vancouver Island and consists of microblades, pebble tools, and flakes, and contrasts with other early cultures in having very few or no bifaces. The North Coast Microblade Tradition is dated from approximately 9000 BP to 5000 or 4500 BP and includes clear evidence of the use of coastal resources.

If the Nenana Complex did exist briefly on the northern Northwest Coast, as suggested as a possibility for Ground Hog Bay earlier in this chapter, it was soon displaced by bearers of a new cultural tradition who were pushing south. The North Coast Microblade Tradition is clearly related to the Denali Complex but differs from it and other interior microblade traditions that have been proposed for northwestern North America in several respects (e.g., MacNeish, 1964; Borden, 1969, 1975; J. Smith, 1974; R. Carlson, 1979, 1983a). There are a number of technological differences between the North Coast Microblade industry and those identified elsewhere in the northwest. Wedge-shaped cores, which are distinctive of central Alaskan and Late Paleolithic northeast Asian assemblages (Nelson, 1937; J. Smith, 1974; Dikov, 1979), are found on the Northwest Coast, but the nodular core form is more common at most sites (R. Carlson, 1983a: 93). In addition, burins and burinated flakes, are common in many northeast Asian and Alaskan assemblages (Goebel *et al.*, 1991), but only burinated flakes are found on the Northwest Coast, and these are not common. Evidently, by the time microblade-makers arrived on the northern Northwest Coast, some aspects of their technology had been lost or altered. Bifaces, for instance, are either very rare or absent in these Northwest Coast sites, yet present in Denali Complex collections (Goebel *et al.*, 1991).

What we are calling the Denali Complex was central to Borden's formulation of the Early Boreal Tradition, and to his ideas about the movements of microblade-makers in North America (Borden, 1969, 1975). Borden envisioned the early microblade-makers of northwestern North America as having an essentially inland, boreal forest, and riverine orientation. This cultural adaptation was thought to be flexible, with subsistence techniques capable of exploiting a wide range of environments (Borden, 1975:12). Borden believed that, as a result of developing population pressures during the early Holocene, inland cultural groups of the early Boreal Tradition began to push east through the valleys of the upper Yukon drainage, ultimately moving into southwestern Yukon and the northern interior of British Columbia (Borden, 1975:9). Following Borden's model the antecedents of the North Coast Microblade Tradition would lie in the early Boreal Tra-

dition, traceable to early inland riverine components like those of the Denali Complex.

This early microblade archaeological culture on the north coast has been variously called the Early Boreal Tradition (Borden, 1975), the Microblade Tradition (R. Carlson, 1979, 1983a), and the Early Coast Microblade Tradition (Fladmark, 1975). Although each of these constructs emphasizes the use of microblades, those proposed by Borden and R. Carlson include early microblade components both along the coast and inland in northwestern North America. Fladmark's more restricted definition includes only the northern Northwest Coast early microblade components. We choose to follow Fladmark here, although we recognize that the separation from inland microblade manifestations is presently based more on differences in environmental context than on demonstrated assemblage differences. Inland microblade-bearing sites adjacent to the Northwest Coast are poorly documented (in contrast with the Old Cordilleran Culture), making comparisons difficult. We realize that our construct, the North Coast Microblade Tradition, differs little from the early Coast Microblade Tradition as proposed by Fladmark—and even the names are similar. At the risk of adding another name to a culture that already seems to have far more than its share, we believe that North Coast Microblade Tradition describes the culture most accurately, because its distribution is restricted to the north coast, and the recent evidence cited here requires modifications to previous formulations leaving us to constantly refer to a modified construct, or, as we have chosen, a new one. In particular, the dating, artifact profile, and inferred derivation differ between ours and Fladmark's constructs.

The early postglacial environment of the north coast, (10,000–8,000 BP) to which the people of the North Coast Microblade Tradition first adapted, was characterized by coastal forests of lodgepole pine, alder, and sedges (Heusser, 1960:183), indicating a cool, moist climate, with high sea levels. Because of the moderating effect of the Pacific Ocean, Holocene climatic changes were never as pronounced here as in the interior. Cedar, the most important plant in native Northwest Coast technology, probably did not reach levels of current abundance on the north coast until about 3000 BP (Hebda and Mathewes, 1984).

Early postglacial sea levels were much higher than at present on the mainland. This was the result of the ice melting faster than the north coast mountains rebounded after the glacier weight was lifted ("isostatic rebound"). Marine transgressions penetrated well up the Skeena Valley immediately following the glacial melt (Clague *et al.*, 1982), and then subsided steadily. In contrast, the Queen Charlotte Islands show a much lower sea level than today prior to 10,000 BP, apparently "the result of a combination of eustatic, isostatic and tectonic factors" (Fedje, 1993:12). Both mainland and island sea levels changed very rapidly to converge at a height of no

more 15 m above modern sea level at about 9000 BP (Fedje, 1993). Since that time there has been a relatively regular decrease in sea level to that of today.

Although all recent work, (e.g., Mathews, 1979:150; Clague, 1983; and Clague *et al.*, 1982), indicates stabilization of sea levels by 8000 BP, Heusser (1960:194) and Fladmark (1975: 151–152) argued earlier for a slower period of subsidence. Fladmark argued that as late as 7500 BP sea level in the Prince Rupert area may have been 40–50 m higher than at present, with stabilization to present conditions not occurring until about 5000 BP. Current evidence indicates that this is unlikely, with a sea-level maximum of about 15 m at about 9000 BP.

The makers of the North Coast Microblade Tradition (dated to a maximum of about 9000 years ago), found a sea level slightly higher than that of today, and a vegetation similar to that of today, with the exception of red cedar. This culture is found in southeastern Alaska, the Queen Charlotte Islands, the lower Skeena Valley, and the central coast of British Columbia. The stability of the North Coast Microblade Tradition, which lasts a minimum of 3500 years, parallels the similar stability shown by the very different Old Cordilleran culture found to the south.

Southeastern Alaska

If people bearing a microblade tradition moved on to the Northwest Coast from central or south coastal Alaska during the early Holocene, their likely point of arrival would have been in the far north, in southeastern Alaska at the junction between the "pan" and panhandle. In 1965 Robert Ackerman began archaeological investigations at the Ground Hog Bay 2 site (GHB 2) in the Icy Strait region of the Alaskan Panhandle, about 65 km west of Juneau (Figure 4-1) (Ackerman, 1968, 1980; Ackerman *et al.*, 1979). This pioneering work revealed not only substantial antiquity of human occupation on the far north coast—equal to that previously discovered by Borden and Cressman on the Fraser and Columbia rivers—but also established for the first time the existence of an early microblade and microcore industry on the Northwest Coast.

Ground Hog Bay 2, like many other early microblade components on the north coast, is located on a raised marine terrace, now 14–15 m above sea level. A beach deposit that contained Component II, which produced microblades and microblade cores, overlays the basal clay deposit that contained the small nonmicroblade Component III assemblage discussed earlier in this chapter. Dates from the microblade component ranged from 8880 ± 125 (I-7057) to 2970 ± 90 (I-7054) BP (Ackerman, 1974:191), an extremely long time span. Ackerman places the microblade industry at the older end of this range, from about 9000–5000 BP.

The Ground Hog Bay 2 microblade industry shows considerable variability, with different microcore forms, apparently varying according to the type of raw material used. Obsidian cores were typically wedge-shaped, often with truncated keels. Marginal crushing and grinding and numerous flake scars were evident on the platforms of these cores. Argillite cores, on the other hand, were typically massive, "cuboid," and lacked platform preparation. Chert and quartz-crystal microcores were also recovered.

Ackerman (1980:193) has noted technological affinities, specifically of platform preparation and shape, between the obsidian microcores from Ground Hog Bay 2 and those from site components of the Denali Complex in central Alaska. Ackerman argues that these similarities are likely the result of interior microblade users from central Alaska or southwestern Yukon migrating to the coastal areas of southeastern Alaska, perhaps via Chilkat Pass, some time between 10,000 and 9000 BP.

The assemblage associated with microblades at Ground Hog Bay 2 included macrocores and flakes, pebble tools, and flake scrapers, all of which are common in other North Coast Microblade assemblages. Abrading stones and four fragments of well-made bifaces were also recovered from Ground Hog Bay 2. Bifaces occur rarely, or not at all, in other North Coast Microblade assemblages, and because an earlier component with bifaces exists at Ground Hog Bay 2, there is the possibility that these artifacts are intrusive. When first reported, Component III was assumed to be part of the microblade complex, and the early radiocarbon date associated with it was thought to date the microblades. Reinvestigation has resulted in the pattern summarized here, according to Ackerman (1980).

Less than 200 km south of Ground Hog Bay is the Hidden Falls site (Davis, 1989) on the northeast shore of Baranof Island (Figure 4-3). A stratified, multicomponent occupation, Hidden Falls has yielded some of the earliest radiocarbon dates anywhere on the Northwest Coast. Component I at Hidden Falls contained an entirely lithic artifact assemblage characterized by a microblade and microcore industry, a high proportion of unformed unifacially flaked tools, and a near absence of bifacial tools. This assemblage (see sidebar) is very similar to that from Component II at Ground Hog Bay 2, but there is no earlier assemblage at Hidden Falls that could be compared to the Component III material at Ground Hog Bay 2.

Component I at Hidden Falls, the earliest human occupation, is associated with stratigraphic Zone I (Davis, 1989:44), a paleosol that formed immediately after late Wisconsinan deglaciation. The earliest radiocarbon date for Zone I, on unburned wood, is 10,345 ± 95 BP, but the oldest date that is likely linked to human occupation, is a date on scattered charcoal from a possible dispersed hearth of 9,060 ± 230 BP (Beta-7440) (Davis, 1989:194). According to Davis (1989:194), Component I occupation may have begun as early as 9500 BP, and terminated with an early Holocene

glacial readvance at ca. 8600 BP. Although a total of seven radiocarbon dates fall within this time range, all are on unburned wood except the one reported above. Furthermore, none are certain to be the result of human activities.

An alternative interpretation to that given above by Davis is that most of the dated material is from the putative glacial advance pushing remnants of a spruce swamp before it. This would explain the 13 unburned wood samples dating between 10,300 and 7200 BP. The actual occupation would have come at the termination of this short-lived glacial advance at about 8600 BP. In any event, Component I dates well before 8000 BP.

> The Component I artifact assemblage includes 199 stone tools and 414 waste flakes (Davis, 1989:159–193). No modified bone or shell was recovered. Cobble tools and unifacial flake tools account for 85% of the assemblage, including 16% gravers, 19% scrapers of varying types, and 5% burinized flakes. The pebble tool industry is represented by 8 tools (4.0%) and a single abrader. The microblade assemblage at Hidden Falls is represented by 11 complete cores, 3 core fragments, and 9 blades of obsidian, chert, quartzite, and diorite. Wedge-shaped microcores on flakes were the most common type; there were also two split pebble cores. No finished bifaces were recovered that could be certainly attributed to this component. One projectile point, however, was recovered that probably belongs to this component. A second leaf-shaped point definitely belongs to this component that was "flaked alternately on the adverse and reverse edges" (Davis, 1989:174) which may be either a preform or a finished specimen.
>
> Davis (1989:195) notes similarities in terms of microcore forms, preparation techniques, and raw material sources between Hidden Falls I and Ground Hog Bay 2 (Component II). Obsidian from Mount Edziza in the northern interior of British Columbia was identified at both sites.

Although Hidden Falls I and Ground Hog Bay 2 (Component II) reveal much about the lithic technology and the age of the North Coast Microblade Tradition, neither had preserved faunal remains. Evidence of early subsistence patterns on the north coast has been recently recovered from the Chuck Lake site (Ackerman *et al.*, 1985, 1989; Ackerman, 1988; Yoshida, 1989 [cited in Ackerman *et al.*, 1989]). This is a shell midden component with microblades, located on Heceta Island, a small outer island at the southern end of the Alexander Archipelago (Figure 4-3). The site includes scattered deposits at elevations from 12–18 m on either side of Chuck Creek, near the source of the creek, Chuck Lake.

The shell strata at Chuck Lake, locality 1, have radiocarbon dates of 8180 ± 130 BP (WSU 3243) 8220 ± 125 BP (shell, WSU 3241) (Ackerman *et al.*, 1985), 7770 ± 600–560 BP and 7150 ± 410–390 BP (Ackerman *et al.*, 1989). Another date of 7360 ± 270 BP (WSU 3242, Ackerman *et al.*, 1985) was obtained from a sample at the interface of the shell midden and the

overlying forest soil, indicating a possible terminal date of occupation. WSU 3241 (8220 BP) is on shell, which usually dates 400 to 800 years too old because of the reservoir effect. These are the earliest reported dates—indicating an age of 7000–8000 BP—from predominantly shell-bearing strata from any Northwest Coast site.

The predominant shellfish in the 30-cm-thick shell layer were, in descending order of abundance, bay mussels, butter clams (*Saxidomus giganteus*), and littleneck clams (*Protothaca staminea*). The bay mussels reflect exploitation of a protected rocky foreshore, and the clams reflect sandy or gravel-bottom intertidal habitats (see sidebar in Chapter 2). Fish comprise 90% of the vertebrate assemblage (a total of around 300 identifiable elements) and mammals and birds the other 10% (Ackerman *et al.*, 1989: 13–14). Over half the fish remains (58%) were of Pacific cod. Greenling, sculpin, and rockfish were of lesser importance. Herring, lingcod, flatfish, and salmonids occurred rarely. Pacific cod is a bottom-feeder that spends most of the year in deep open water (Hart, 1973:222). In spring these fish migrate into shallow water, where they can be caught with hook and line. This migratory behavior of cod is consistent with a spring occupation at the Chuck Lake site. Mammal remains include one Steller sea lion element and 17 of other unidentified sea mammals, 2 beaver, and 2 deer or caribou. The faunal remains, in general, reflect a subsistence pattern based on intertidal to deep nearshore marine resources. Terrestrial resources were of only minor importance.

The tool assemblage at Chuck Lake is mainly lithic, but did include one unilaterally barbed fixed bone point, which may have been used as a fish spear. The microblade industry is well represented by 9 microblade cores and 58 whole or broken microblades (Ackerman *et al.*, 1985:126). The principal raw material used for making microblades was argillite, and rarely, obsidian, vein quartz, marble, and chert. Chuck Lake microcores were produced from rounded pebbles and had forms that are similar to the argillite microcores from Ground Hog Bay 2 and from sites on the Queen Charlotte Islands (Ackerman *et al.*, 1989:15). Three large cobble cores for large flakes were also recovered, along with one modified spall, three abrasive stones, and two anvil stones (Ackerman *et al.*, 1985:126).

Queen Charlotte Islands

On the Queen Charlotte Islands, early microblade components have been assigned to the Moresby Tradition (Fladmark, 1975), a local variant of the North Coast Microblade Tradition. Typically located on raised beach deposits, Moresby Tradition sites are characterized by a microcore and blade industry based mainly on argillite and pebble and flake tools. Chipped bifaces are absent. Existing dates are from about 7500 to 5000 BP. In general, strong technological similarities are evident between Moresby

Tradition components and those from southeastern Alaska. Dated components include Lawn Point, Kasta (Fladmark, 1986a), and the Cohoe Creek site (Ham, 1990) (Figure 4-3).

The Moresby Tradition microblade industry is generally similar to the argillite material from southeastern Alaska (Ackerman *et al.*, 1979; Ackerman, 1980). Fladmark (1986a) describes two microcore types from Lawn Point and Kasta (see sidebar): pebble and flake microcores. Both forms were recovered at Ground Hog Bay 2 and Hidden Falls. There is no mention of wedge-shaped cores, but this may well be related to the absence of obsidian.

Lawn Point and Kasta both appear to be regularly reused camp locations on marine beaches or estuaries (see sidebar). Based on their locations, a marine resource exploitation is indicated, but faunal evidence to support this is lacking, because none was preserved at either site. Limited faunal remains, though, are present at Cohoe Creek (see sidebar).

> The Lawn Point site is located on the east coast of Graham Island about 15 km north of Skidegate (Figure 4-3), at an elevation of about 15 m above sea level. The earliest cultural material at Lawn Point lies directly on paleo-beach sediments, and corresponds to a period of raised sea levels. Fladmark (1986a:42) identified six cultural components at the site; argillite microblades were recovered from all but the latest component (Table 4-1). A pebble core and flake industry was also present, but chipped bifaces were absent (Figure 4-9). Of particular interest were the apparently undisturbed remains of a flaking station in Component 5 (7400–7000 BP), two clusters of microblades, a microcore, numerous flakes, pebble cores, and hammerstones, all within a 4-sq.-m area (Figure 4-9). The two small piles of microblades suggest that a number of

TABLE 4-1 Lawn Point Artifact Assemblage[a]

Components	1[b]	2[b]	3[b]	4[b]	5[b]	6[b]	Site total[c]
Microblades	—	11/20	69/24	8/20	79/62	1/7	168/31
Microcores	—	3/5	11/4	—	2/2/	—	16/3
Pebble cores	3/14	9/16	58/20	7/17	21/17	5/36	103/19
"Choppers"	11/52	1/2	4/1	1/2	1/1	—	18/4
Utilized flakes	2/10	23/42	103/35	12/29	8/6	4/29	152/28
Retouched flakes	3/14	7/13	28/10	7/17	7/6	2/14	54/10
Scraper-cleavers	2/10	1/2	7/2	3/7	3/2	1/7	17/3
Nosed scrapers	—	—	7/2	3/7	1/1	—	11/2
Gravers	—	—	5/2	—	1/1	—	6/1
Hammerstones	—	—	1/0.3	—	4/3	1/7	6/1
Component totals	21/3[c]	55/10	293/53	41/7	127/23	14/3	551

[a] From Fladmark, 1986a.

[b] Number found/percentage of component.

[c] Number found/percentage of site total.

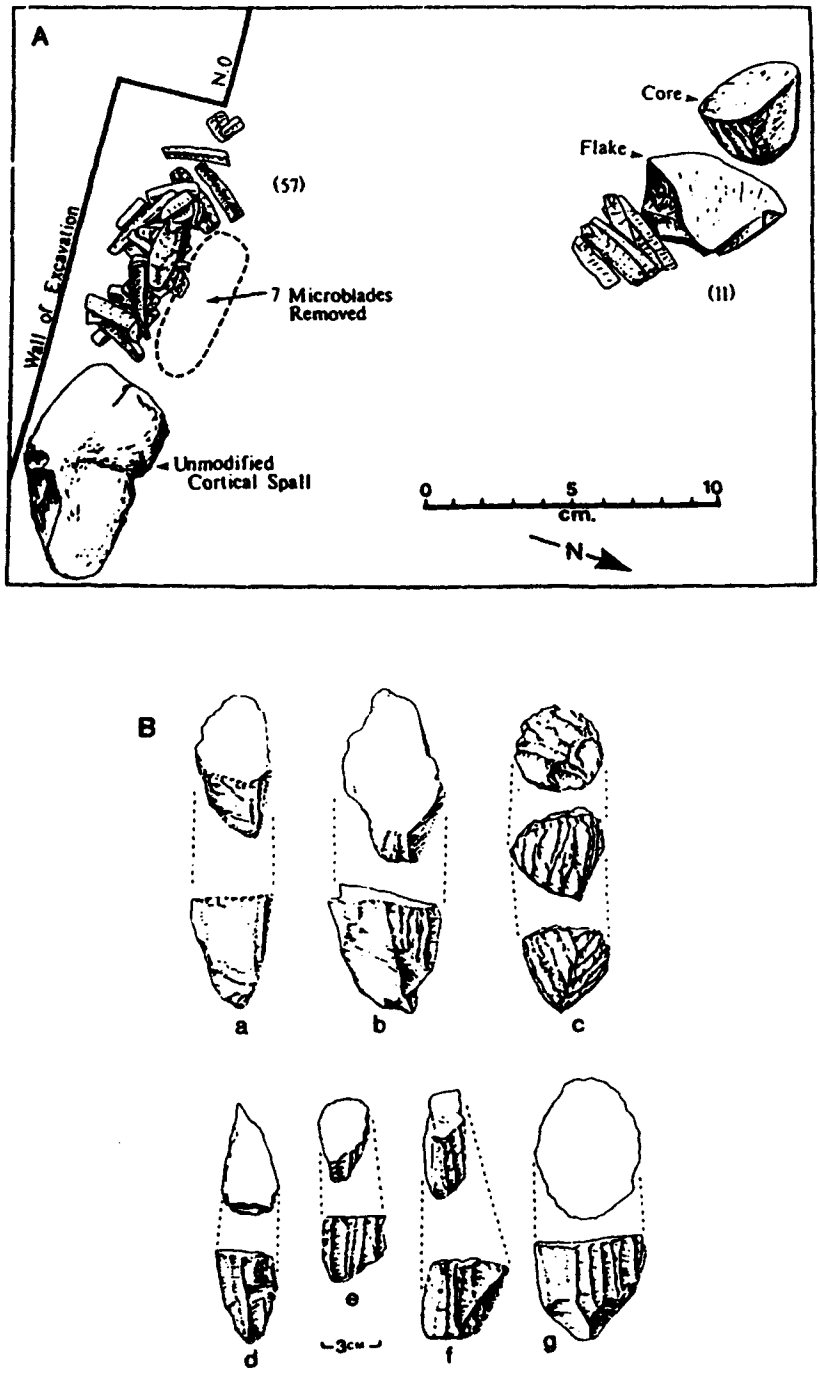


FIGURE 4-9 Lawn Point artifacts. (A) Distribution of microblades in component 5. (B) (a–g) microblade cores. (From Fladmark, 1986a.)

blades were manufactured at the same time, perhaps in anticipation of some future task. This feature provides a rare glimpse into the organization of lithic technology within the North Coast Microblade Tradition.

Kasta is located on raised beach deposits about 500 m inland from the north shore of Moresby Island, near Sandspit (Figure 4-3). When occupied, the site may have been situated in an estuary. Radiocarbon dates place the time of occupation somewhat later than Lawn Point, 6000–5400 BP (Fladmark, 1986a:54), a late Moresby Tradition Component. Like Lawn Point, the Kasta assemblage is dominated by a microblade industry, and lacks bifaces (Table 4-1).

The Cohoe Creek site (Ham, 1990) provides faunal data to fill in some of this missing information on subsistence behavior in the Moresby Tradition. Cohoe Creek is a small shell midden and lithic scatter located about 15 m above sea level at the mouth of Cohoe Creek on Masset Inlet. Radiocarbon dates range from 6150 to 5000 BP, making it another late Moresby Tradition component. Because the artifact collection was mainly surface collected, what is of interest is the faunal remains, which included samples from a road-cut exposure.

The Cohoe Creek faunal assemblage includes a variety of shellfish remains recovered from a series of thin strata. Bay mussel, rock cockle (*Clinocardium nuttallii*), and littleneck and butter clams were the species most frequently identified. Most of the surface-collected fish remains have been tentatively identified as jack mackerel (*Trachurus symmetricus*), a rather uncommon species in Northwest Coast middens. Ham (1990:211) notes that these fast swimmers are mainly southern fish. He argues their presence in Masset Inlet indicates that water temperatures were warmer 5000–6000 years ago than they are today. Jack mackerel are, however, found along the west coast of Vancouver Island during the summer in some numbers (A. McMillan, pers. comm.). Hart (1973:287–88), moreover, indicates large members of this species are found off British Columbia, inluding the "Queen Charlotte Islands, offshore rather generally, between May and October" (Hart, 1973:88).

Skeena Valley

The North Coast Microblade Tradition is presently represented by only one component on the north coastal mainland of British Columbia. At Kitselas Canyon on the Skeena River (Figure 4-3), the Bornite phase component at the Paul Mason site (Coupland, 1988a) contains 116 microblades, pebble tools, and flakes, and dates from 5000 to 4300 BP, rather late in comparison to other North Coast Microblade Tradition components. Formed bifaces and unifaces were not recovered; nor were complete microcores, so core shape is unknown (Figure 4-11). The Bornite phase microblades were manufactured mainly from obsidian from the Anahim area of central British Columbia (Godfrey-Smith, 1984), which may be a reflection of trade links or historical connections in that direction.

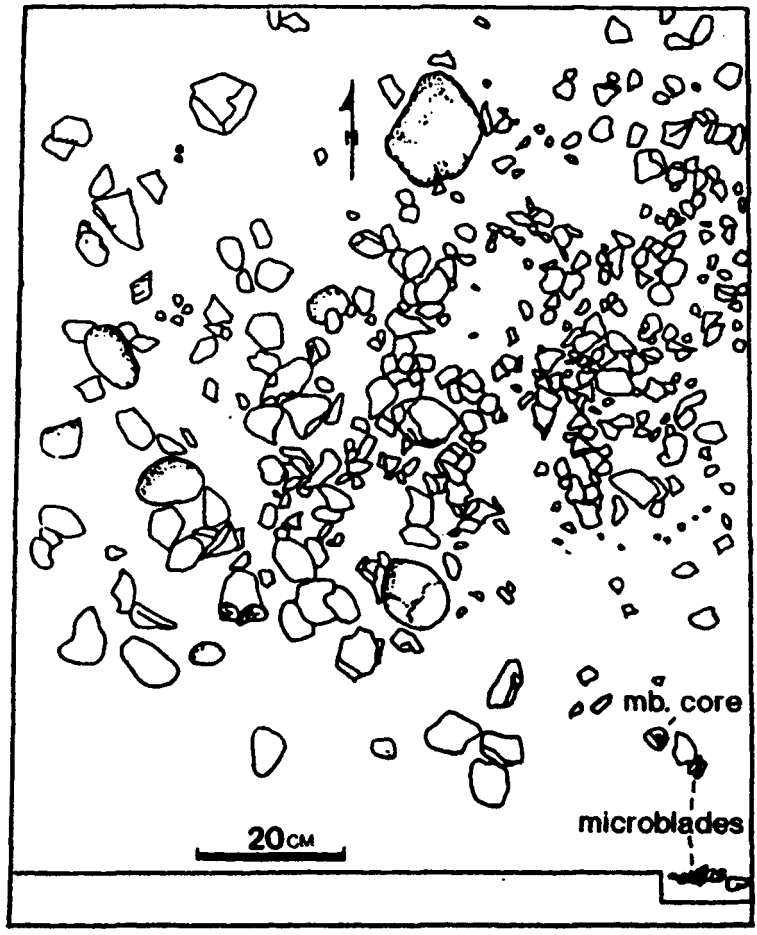


FIGURE 4-10 Lawn Point flake cluster (includes figure 4-9A in bottom right-hand corner.) (From Fladmark, 1986a.)

The Bornite phase component at Kitselas Canyon was probably a small seasonal camp, the only riverine component known from the North Coast Microblade Tradition. Faunal remains were not preserved, but given the location of the site at the first major constriction of the Skeena River, we believe that fishing was an important subsistence activity.

Central Coast of British Columbia

The important site of Namu is located south of the Skeena, in Fitz Hugh Sound on the central coast of British Columbia, near the entrance to Burke Channel (Figure 4-3). First excavated in 1969 and 1970 (Hester and Nelson,

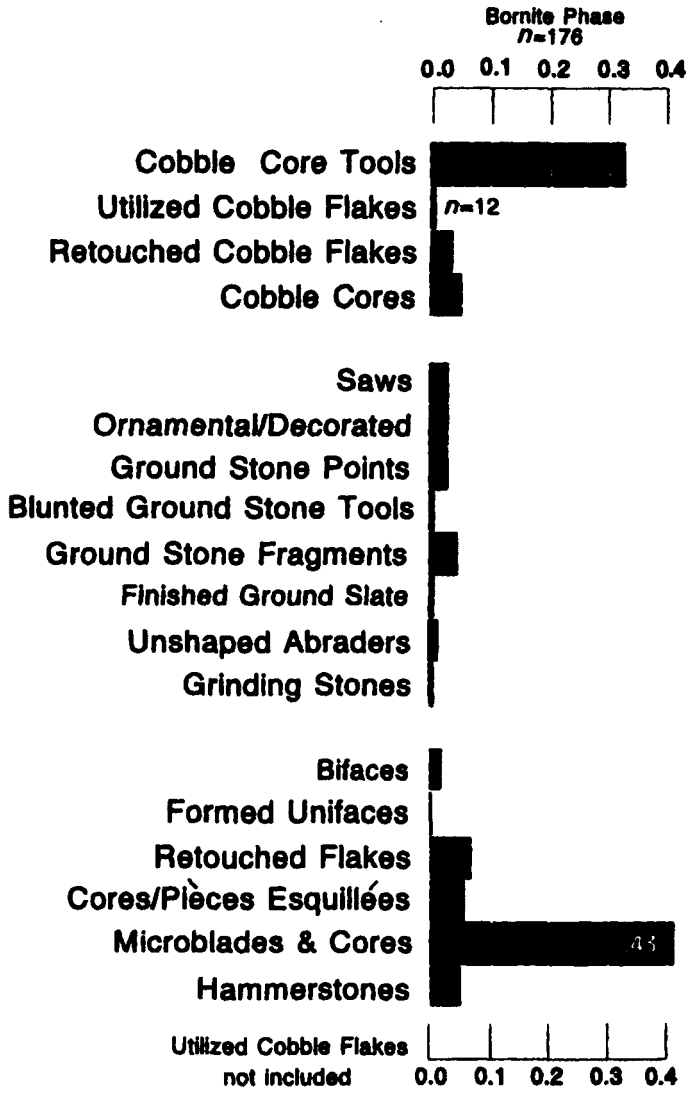


FIGURE 4-11 Bornite artifact assemblage. Note separation into cobble, ground stone, and chipped stone categories, and predominance of cobble core tools and microblades and cores. (From Coupland, 1988b.)

1978), and then again in the late 1970s (R. Carlson, 1979), Namu is a deeply stratified site, containing deposits spanning almost the entire Holocene. A sequence of six chronological periods of occupation has been proposed by

R. Carlson (1991a). Early Holocene material comes from stratum II, the so-called black matrix, and has been divided into cultural periods 1 and 2. Six radiocarbon dates for Period 1 range from 9720 ± 140 (WAT 452) to 6550 ± 90 (WAT 517) BP (R. Carlson, 1991a:92). According to R. Carlson, microblade technology was added to the cultural inventory at about the middle of Period 1, roughly 8000 BP and continues into Period 2. As we noted earlier in this chapter, R. Carlson believes the earliest material predates the North Coast Microblade Tradition. The range of radiocarbon dates for Period 2 is from 6060 ± 100 (WSU 1941) to 5170 ± 90 (WAT 451) BP (R. Carlson, 1991a:92).

According to R. Carlson (1983a:91) the microblade industry from Namu is basically similar to the southeastern Alaskan and Queen Charlotte Island industry. However, the definite presence of a developed bifacial flaking industry would seem to set Namu apart from the northern sites, and at the same time suggests cultural influence from the south (R. Carlson, 1979:221). Given its location on the central coast of British Columbia, Namu may have existed at the interface between the North Coast Microblade Tradition to the north and the Old Cordilleran to the south.

Shell and other faunal material at Namu are absent from deposits associated with Period 1, but small amounts of shell and bone were preserved in deposits dated to Period 2. Faunal analyses of Period 2 remains (Conover, 1978; Cannon, 1991) indicate the exploitation of littoral resources. Noting the presence of seal, sea lion, sea otter, and dolphin, Conover (1978:97) argues that a formal system of marine exploitation must have existed, with watercraft and specialized equipment.

Although shellfish appear to have been all but ignored during Period 2, the vertebrate faunal assemblage is significant for the inclusion of nearly the entire range of species recovered from later periods. Salmon is the dominant fish class, accounting for 81% of all identified faunal elements, although it is less abundant at this time (in terms of total numbers of elements) than in later periods. It is plausible that salmon were obtained as they spawned in the Namu River. Rockfish were the only other fish to account for more than 4% (4.5%) of the identified faunal remains (Cannon, 1991:33).

Deer, at 2.7%, and harbor seal (1.1%) were the most abundant mammal remains. In this area elk are not common. Cannon (1991:12) attributes much more importance to harbor seal than deer as a food resource, but he minimizes the importance of deer, noting that among the ethnographic Bella Coola, deer are said to be rarely eaten (see McIlwraith, 1948:2). Deer bones, however, outnumbered seal bones in this period by 191 to 81 (Cannon, 1991:12). In fact, if not ignored as food—if they were not only used for their hides and as a source for bone tools—deer appear to be second only to salmon in importance in Period 2 at Namu. This does not negate

Cannon's assertion that Namu was primarily maritime focused—virtually all resources other than deer came from the sea or river—but it would mean that terrestrial fauna also significantly contributed to the diet.

Summary of the North Coast Microblade Tradition

The North Coast Microblade Tradition extended from the north tip of the Alaskan Panhandle to opposite the northern tip of Vancouver Island on the British Columbian mainland and lasted from at least 8600 to perhaps 4500 BP. Technologically, it is characterized at all sites by well-developed microblade and pebble tool industries. Bifaces are either absent or rare except at Namu, which may be at the geographical interface between this culture and the Old Cordilleran. The New World origin of the North Coast Microblade Tradition undoubtedly lies to the north, with close technological affinities to the Denali Complex of central Alaska. In fact, as R. Carlson (1979) and Borden (1975) have suggested, it is unclear if the coastal microblade sites have a significantly different technology. The only certain North Coast Microblade site with faunal remains, the Chuck Lake site, shows use of a wide variety of coastal resources, including shellfish and pelagic fish.

There is little evidence at present to indicate any linkage between the North Coast Microblade Tradition and the earliest components at Ground Hog Bay 2 and Namu. Although these latter are either very small (Ground Hog Bay 2) or incompletely described (Namu) they lack microblades but have bifaces, the opposite of the North Coast Microblade Tradition.

One of the remarkable aspects of the North Coast Microblade Tradition is its apparent technological stability in a rapidly changing early Holocene environment characterized by forest succession and sea-level fluctuations. The technology remained virtually unchanged over a period of 4000 years. Economically, this culture provides clear evidence of the early use of maritime resources on the Northwest Coast. Salmon, shellfish, pelagic fish, and sea mammals were clearly being exploited by 8000–7,000 BP at Chuck Lake, and at the later (and less certain members of this tradition) Cohoe Creek and Namu sites.

CHAPTER SUMMARY

One of humankind's great epics took place 14,000–11,500 years ago when people of Asiatic stock with an Upper Paleolithic-based technology traveled across Beringia and entered North America. Although the abundant Clovis evidence south of the continental glaciation indicated that an ice-free corridor must have existed prior to 11,000 BP, it has been only in the last few years that its existence has been documented. Similarly, the

recent discovery of the Nenana Complex has verified the presence of a suitable Clovis progenitor in Alaska. This comes after many years of hypothesizing, argument, and searching for such a culture. The Nenana Complex not only shares with Clovis a similar lithic technology and Upper Paleolithic derivation, but also has the requisite dates of greater than 11,000 years ago. The results of this recent research, along with the discovery and dating of the East Wenatchee Clovis site—the first well-dated Clovis site in the Pacific Northwest—represent a triumph of conventional archaeological wisdom, which is now finally validated.

The East Wenatchee site, located adjacent to the Northwest Coast, gives plausibility to the notion that Clovis people were the first humans on the Northwest Coast. R. Carlson's alternative suggestion, though, that the Northwest Coast may have been first used by descendants of the Nenana complex, coming directly from Alaska, must be taken seriously. Ground Hog Bay 2 does have a very small nonmicroblade component with two obsidian biface fragments, beneath a microblade component, which might be seen to be representative of such a migration. The East Wenatchee site also supports the idea that the Protowestern is derived from Clovis and that the earliest material at Namu (and Ground Hog Bay), as well as the later Old Cordilleran, can be seen to be Clovis descendants.

If Greenberg (1987) is correct, the Clovis descendent cultures would have spoken early forms of Amerind, but the microblade-using cultures would have spoken languages related to Athapaskan or Na-Dene (Borden, 1969). This deep linguistic division may be reflected in the two earliest well-attested manifestations of archaeological cultures on the Northwest Coast, the North Coast Microblade Tradition, and the Old Cordilleran Culture.

Cultural stability for at least 3000 years is shown both by the North Coast Microblade Tradition and the Old Cordilleran coastal sites. In spite of a number of similarities in adaptation, these two cultures have very different technologies. With its characteristic microblade industry, the North Coast Microblade cultures had more in common in lithic technology with assemblages from the northern interior than from the coast to the south. Likewise, the coastal assemblages to the south are much more similar to the Old Cordilleran assemblages from the plateau interior than to the North Coast Microblade culture.

Both the Microblade and coastal Old Cordilleran cultures have components showing extensive early use of maritime resources, such as at Bear Cove and Chuck Lake, as well as sites apparently oriented around riverine salmon runs (Dalles, Milliken, Paul Mason). Other sites, such as Glenrose and Namu, show the use of a range of terrestrial and coastal resources. The actual contribution of the various resources in each culture remains ambiguous, as only the Glenrose component has a clear seasonality. What is evident, though, is that nearly all the resources used later were used to some degree.

The technological differences that distinguish the cultures of the north coast from the central and south coasts were probably greater during the period from 9000 to 4500 BP than at any time subsequently. As we will see in the coming chapters of this book, the axis of cultural difference on the Northwest Coast, which began as north versus south, soon became coast versus inland.

On the coast of British Columbia, Namu appears to have been geographically and culturally transitional between the dominant northern and southern cultural traditions of this period. Namu combined technological aspects of both the northern (microblades and pebble tools) and southern (leaf-shaped points and knives and abundant pebble tools) cultural traditions.

Technological and possible economic differences notwithstanding, the early cultures of the northern and southern coasts were similar in a number of ways. In both areas site components are generally small with a focus on locally available resources. A foraging strategy is suggested with considerable settlement mobility. There is no evidence of permanent seasonal villages or storage during this period. Whether the emphasis was on marine or terrestrial resources, the pattern was for the consumers to move to the resources.

The northern and southern cultures were probably also alike in terms of social organization. Most likely small "band-size" groups of perhaps 25 to 40 people (Martin, 1973) formed the basis of society along the entire Northwest Coast during this early period. There is no evidence of large site components that might suggest the formation of seasonal population aggregates of a size consistent with ethnographic winter villages. In fact, most of the site components are very small, often of the size associated with a single family. Nor is there evidence of pronounced social inequality at this time.

The early prehistoric cultures of the Northwest Coast had little in common with those of the ethnographic present. After about 4500 BP, however, changes begin to occur that ultimately led to the evolution of the Developed Northwest Coast Pattern. The first of these changes, as we will see in Chapter 5, was the development of a series distinctive coastal adaptations along the entire Northwest Coast; distinctive in artifact styles from neighboring inland cultures and from their coastal neighbors.

5

The Emergence of Distinctive Coastal Cultures

* * *

CENTRAL AND SOUTH COAST CULTURES

In contrast to the earlier archaeological cultures, those of this adaptive stage—ca. 4500 to 3300 BP in the central and northern Northwest Coast—are limited to coastal locations, differing significantly from neighboring interior cultures, and also showing an unequivocal adaptation to coastal resources. At the same time, there exist few of the traits—winter villages, multifamily houses, large-scale storage, and evidence of ascribed social status—that are associated with the Developed Northwest Coast Pattern. The density of sites as well as the pace of change definitely increases, with the result that this adaptive stage, which lasts no more than one-third as long as the previous one, is known from at least as many sites. The best evidence of these developments, as with so many others, comes from the Gulf of Georgia

area on central Northwest Coast. We begin our discussion of this stage there, briefly refer to sites further to the south, and then to the north coast.

Gulf of Georgia

There are two named archaeological cultures in the Gulf of Georgia area, the Mayne phase (R. Carlson, 1970) and the St. Mungo phase (Calvert, 1970; Matson, 1976, 1981), that fit this stage. These two manifestations apparently overlap in time, and possibly in geographical extent. They share traits with a third culture, the Eayem phase (Borden, 1975), originally defined in the Fraser Canyon. Borden (1975) has linked all three together into the Charles culture. We believe that the evidence supports Borden's interpretation, in that there are significant similarities shared by these three cul-tures, and each should be considered part of a larger whole. There are, however, important questions about the differences between the Mayne and St. Mungo phases that bear on the development of the next Gulf of Georgia phase, the Locarno Beach phase. Only the St. Mungo phase is documented sufficiently to evaluate in detail, so we will examine it before we return to the possibility of a different coeval culture being present in this area.

The St. Mungo culture has well-described components from three sites in the Fraser delta: St. Mungo, Glenrose, and Crescent Beach (Figure 5-1); it is best known from the St. Mungo (Calvert, 1970; Boehm, 1973; Mackie, 1982; Ham *et al.*, 1986) and the Glenrose sites (Matson, 1976, 1981). The St. Mungo site has undergone two major excavations, one in the late 1960s by S. Gay Frederick (née Boehm, Calvert) and one in 1982 reported by Ham *et al.* (1986), both of which include faunal analyses. The Glenrose site, located only 1000 m upstream from St. Mungo also has a large St. Mungo phase component, and Matson's report (1976, 1981) included faunal analyses. A third site, Crescent Beach, has a St. Mungo component, first reported by Percy (1974), and then reinvestigated, complete with faunal analyses by Matson (Matson *et al.*, 1991; Matson, 1992).

As noted in Chapter 4, Glenrose also contains an Old Cordilleran component, and so offers an opportunity to investigate the relationship between the two sequential cultures. Matson (1976, 1988a) argues that there is an evolutionary relationship between the two, with St. Mungo evolving out of Old Cordilleran, and has demonstrated a close similarity between the two Glenrose chipped stone industries (Figure 5-2). That the St. Mungo–Mayne cultures developed out of the Old Cordilleran now appears to be conventional wisdom (Carlson, 1990b:67).

Although the initial site reports from St. Mungo (Calvert, 1970; Boehm, 1973) and Glenrose (Matson, 1976) indicated that this culture began at 4300 BP, slightly earlier dates have been recorded since. These include a number of earlier dates from another part of the St. Mungo site (Ham

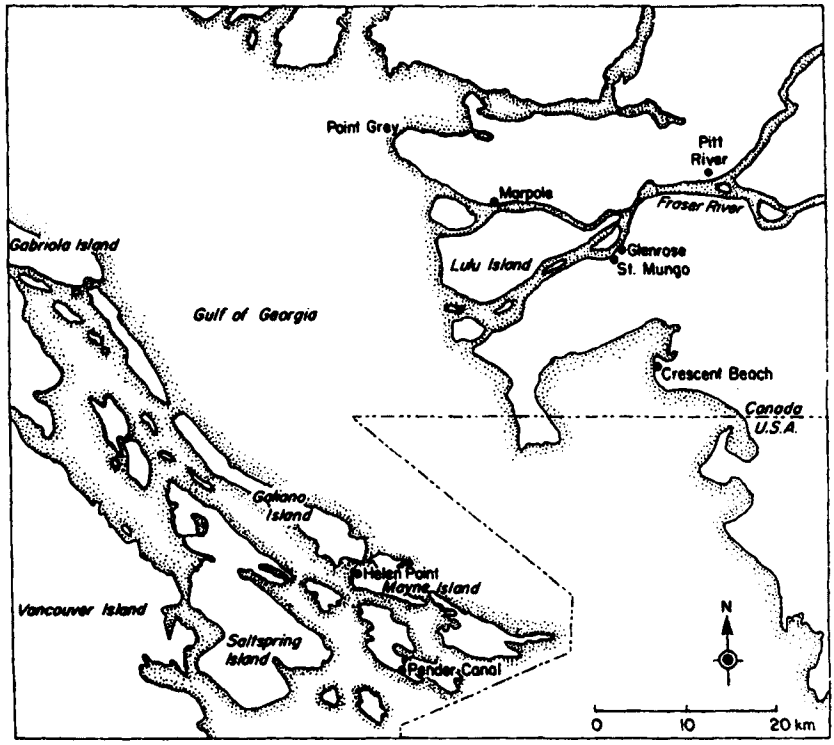


FIGURE 5-1 Sites with St. Mungo–Mayne phase components near Vancouver.

et al., 1986) and from the Crescent Beach (Percy, 1974; Matson *et al.*, 1991) which indicate that the initiation of the St. Mungo culture may be better dated at 4500 BP. Given the probable evolutionary development from the Old Cordilleran, the exact date for the beginning of the St. Mungo is apt to be arbitrary. As to the termination, in 1976, Matson argued that the St. Mungo Phase ended at 3300 BP based on the terminal dates from Glenrose and the dates for the succeeding Locarno Beach phase at Montague Harbour on Galiano Island (Mitchell, 1971b). This limit appears to be valid today, although dates reported by Ham *et al.* (1986) from St. Mungo may indicate that this culture ended by 3400 BP. In summary, based on more than thirty radiocarbon dates, the St. Mungo phase has a duration that minimally spans from 4300 to 3500 BP, and maximally from 4500 to 3300 BP.

Given a duration of 800–1200 years, it is striking that in the Gulf of Georgia area at least 12 sites (Table 5-1) have been excavated that have clear signs of this or the closely related Mayne phase, compared with the previous 4000-year duration of the Old Cordilleran phase definitely

represented only by Glenrose. To be sure, three undated components at Birch Bay (45 Wh-24 and Wh-29)(Larsen, 1971) and Ferndale have been "tentatively" (Grabert, 1979:172) assigned to the Old Cordilleran culture. Even given the probability that rising sea levels may have destroyed or covered up older sites, this increase in number of known sites is significant.

All three well-documented St. Mungo artifact assemblages from Glenrose, St. Mungo, and Crescent Beach have been reclassified and analyzed by Pratt (1992). This gives us a secure base to discuss the kinds and quantities of artifacts found during this phase (Table 5-2). Considering the apparent evolution of this phase from the Old Cordilleran, one would expect many of the types present in the older culture to be present in St. Mungo. This is the case (Figure 5-2), although the frequencies are often very different, as the sidebar indicates. The Old Cordilleran at Glenrose was dominated by cobble tools, but these artifacts never reached 10% in St. Mungo components, and, although leaf-shaped points are found in both components, stemmed, shouldered points are also found in St. Mungo components (Figure 5-3). Ground stone tools, from abrasive stones to ground stone points and beads, along with incised, decorated schist/mudstone

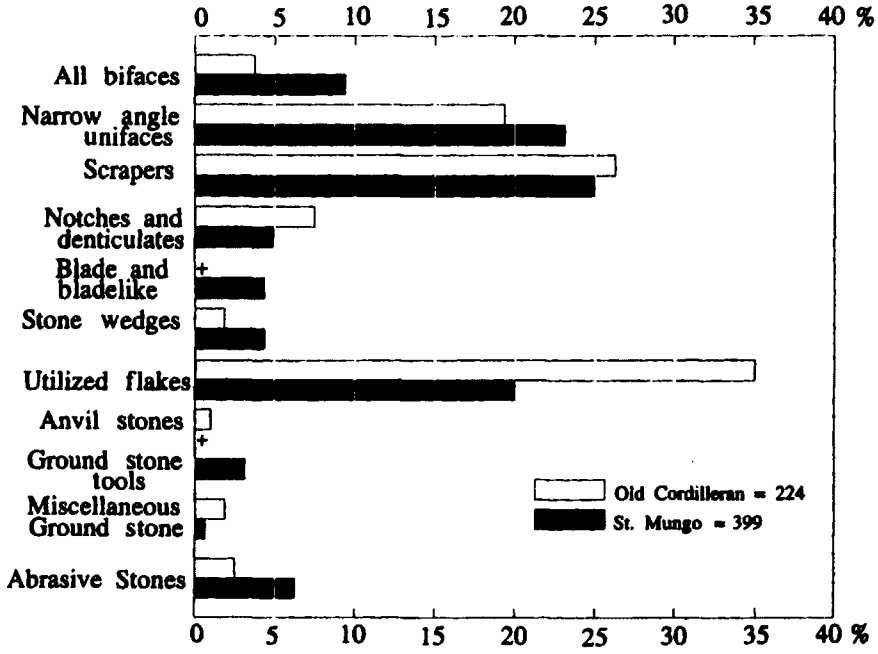


FIGURE 5-2 St. Mungo lithic tools compared with Old Cordilleran tools at the Glenrose Cannery site. (Note that cores, hammerstones, and pebble tools are removed from this comparison.)

TABLE 5-1 Charles Culture Components

Site	References
St. Mungo	Calvert, 1970 Boehm, 1973 Mackie, 1982 Ham *et al.*, 1986
Glenrose	Matson, 1976, 1981
Crescent Beach	Percy, 1974 Matson *et al.*, 1991 Matson, 1992 Pratt, 1992
Helen Point	R. Carlson, 1970, 1975 McMurdo, 1974
Pender Island	R. Carlson, 1986
Tsawwassen	Curtin, 1991
Marpole (?)	Burley, 1979b
Pitt River	Patenaude, 1985
Bliss Landing	Beattie, 1972
Deep Bay	Monks, 1977
Denman Island	Eldridge, 1987
Duke Point (DgRx 5)	Murray, 1982
Maurer site	LeClair, 1976
Hatzic Rock	Mason, 1994
Esilao site	Borden, 1975

tablets, are all recorded from at least two of the three components. These make up the earliest significant ground stone assemblages along the Northwest Coast, but the later important ground slate knife is absent, or very nearly so.

Bone tools make up about a third of the assemblages, being protected from deterioration by the wet, acid soil conditions found in the Northwest by the presence of dense shell middens. Bone tool types include awls, unipoints, bipoints, bird-bone tubes, beaver incisors, and bone pendants (Figure 5-3B). Shell beads and adze and knife blades made from California mussel (*Mytilus californianus*)—not present today in the Vancouver area—are also found. A number of antler wedges, harpoons, barbed points, and a single anthropomorphic figure (from Glenrose) are also present (Figure 5-3A).

Although cobble tools continue to be found in the St. Mungo phase, they occur less frequently than in earlier times. For instance, the category

TABLE 5-2 St. Mungo Phase Artifacts from Glenrose, St. Mungo, and Crescent Beach[a]

Artifact type	Glenrose No.	Glenrose %	St. Mungo No.	St. Mungo %	Crescent Beach No.	Crescent Beach %
Chipped stone						
Core	54	7.1	49	6.8	55	9.6
Bipolar implement	4	0.5	26	3.6	49	8.6
Hammerstone	13	1.7	14	2.0	4	0.7
Anvilstone	1	0.1	1	0.1	5	0.9
Pebble tool	23	3.0	19	2.6	19	3.3
Cortex spall	11	1.5	3	0.4	14	2.4
Utilized flake	82	10.8	44	6.1	118	20.6
Scraper	57	7.5	19	2.7	31	5.4
Unifacially retouched flake	116	15.2	75	10.4	19	3.3
Bifacially retouched flake	12	1.6	14	2.0	2	0.4
Leaf-shaped biface	19	2.5	7	1.0	7	1.2
Stemmed biface	4	0.5	13	1.8	6	1.1
Biface fragment	29	3.8	27	3.7	14	2.4
Total	425	55.8	311	43.2	343	59.9
Ground stone						
Abrasive stone	18	2.4	12	1.7	18	3.2
Biface	2	0.3	0	0	0	—
Biface fragment	2	0.3	4	0.5	0	—
Misc. ground stone	8	1.1	5	0.7	1	0.2
Decorated ground stone	6	0.8	4	0.6	1	0.2
Ground stone bead	(5	0.7)	(4	0.6)	(508	42.4)
Total	41	5.6	29	4.1	528	46.0
Bone implements						
Perforated bone pendant	13	1.7	13	1.8	1	0.2
Toot pendant	8	1.1	12	1.7	2	0.4
Splinter bone awl	27	3.6	36	5.0	15	2.6
Split rib awl	0	—	0	—	6	1.1
Formed bone awl	24	3.2	14	1.9	12	2.1
Bird bone awl	0	—	1	0.1	2	0.4
Ulna awl	3	0.4	1	0.1	2	0.4
Unipoint	12	1.6	4	0.5	5	0.9
Bipoint	1	0.1	2	0.3	1	0.2
Bone chisel	25	3.3	22	3.0	10	1.8
Lanceolate-shaped point	6	0.8	10	1.4	5	0.9
Chisel/point fragment	7	0.9	19	2.7	12	2.1
Unilaterally barbed point	1	0.1	2	0.2	1	0.2
Bilaterally barbed point	1	0.1	0	—	0	—
Decorated bone objects	3	0.3	6	0.8	4	0.7
Bone tubes	0	—	3	0.4	0	—
Misc. Bone implement	3	0.3	7	1.0	4	0.7
Worked bone medial fragment	72	9.5	118	16.4	80	14.0
Worked bone end fragment	30	3.9	41	5.7	35	6.1
Total	236	30.9	311	43.0	197	34.4

(*Continues*)

TABLE 5-2 (*Continued*)

Artifact type	Glenrose No.	Glenrose %	St. Mungo No.	St. Mungo %	Crescent Beach No.	Crescent Beach %
Antler implements						
Antler wedge	32	4.2	27	3.8	1	0.2
Unilaterally barbed pt./harp.	2	0.2	2	0.3	1	0.2
Bilaterally barbed pt./harp.	1	0.1	2	0.3	0	—
Punch	7	0.9	4	0.6	1	0.2
Anthropomorphic object	1	0.1	0	—	0	—
Misc. object	0	—	2	0.2	2	0.4
Worked antler fragment	7	1.0	23	3.2	3	0.6
Total	50	6.5	60	8.4	8	1.6
Shell artifacts						
Shell bead	(136	15.1)	0	—	(116	9.7)
Shell pendant	0	—	0	—	1	0.2
Shell adze blade	0	—	2	0.3	1	0.2
Misc. ground shell fragment	2	0.3	3	0.4	0	0
Total (without beads)	2	0.3	5	0.7	2	0.4
Total (with beads)	138		5		118	
Grand total (without beads)	752		716		570	
Grand total (with beads)	890		716		1194	

*After Table 2.3, Pratt, 1992.

of "modified cobbles" (Matson, 1976:290) is 31% for Old Cordilleran and 6% for St. Mungo at Glenrose. Leaf-shaped points are the most common form in St. Mungo, but stemmed projectile points also occur, and many of the leaf-shaped points are smaller than those common in the Old Cordilleran. Otherwise the chipped stone industries are relatively similar in the two cultures, as shown in Figure 5-2.

Ground stone tools make their first significant appearance in the St. Mungo phase, although they make up only a small part of the total tool assemblage. At Glenrose only 3 abrasive stones and 4 miscellaneous ground stone fragments are present in the Old Cordilleran (Matson, 1976:290–291), compared to 17 abrasive stones and 18 other ground stone artifacts in the St. Mungo, a very significant increase considering that there are more lithic tools in the Old Cordilleran than the St. Mungo component at Glenrose. Of particular importance is the presence of two ground slate points and fragments of a third at Glenrose, and ground stone decorated shist/mudstone tablets (Figure 5-3B l, k).

Abrasive stones are found in all three components and ground slate points and decorated tablets are present in two of three St. Mungo components. Ground slate knives, celts, and labrets (Table 5-2) are absent from all three components. Because these tool assemblages are quite

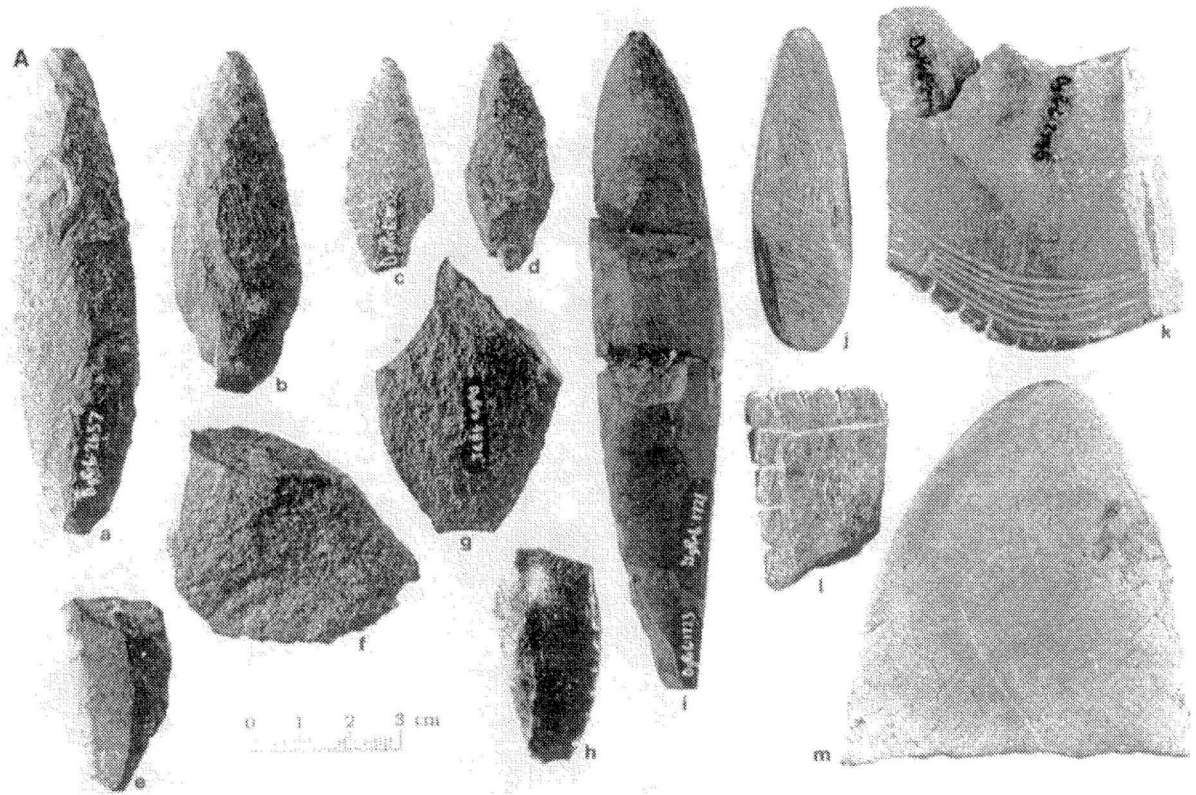


FIGURE 5-3A St. Mungo phase tools from Glenrose. (a, b) Leaf-shaped points; (c, d) contracting stem points; (e) straight-edged scraper; (f, g) unifacially retouched flake; (h) bifacially retouched flake; (i, j) ground stone points; (k, l) incised, decorated ground stone; (m) shaped abrasive stone.

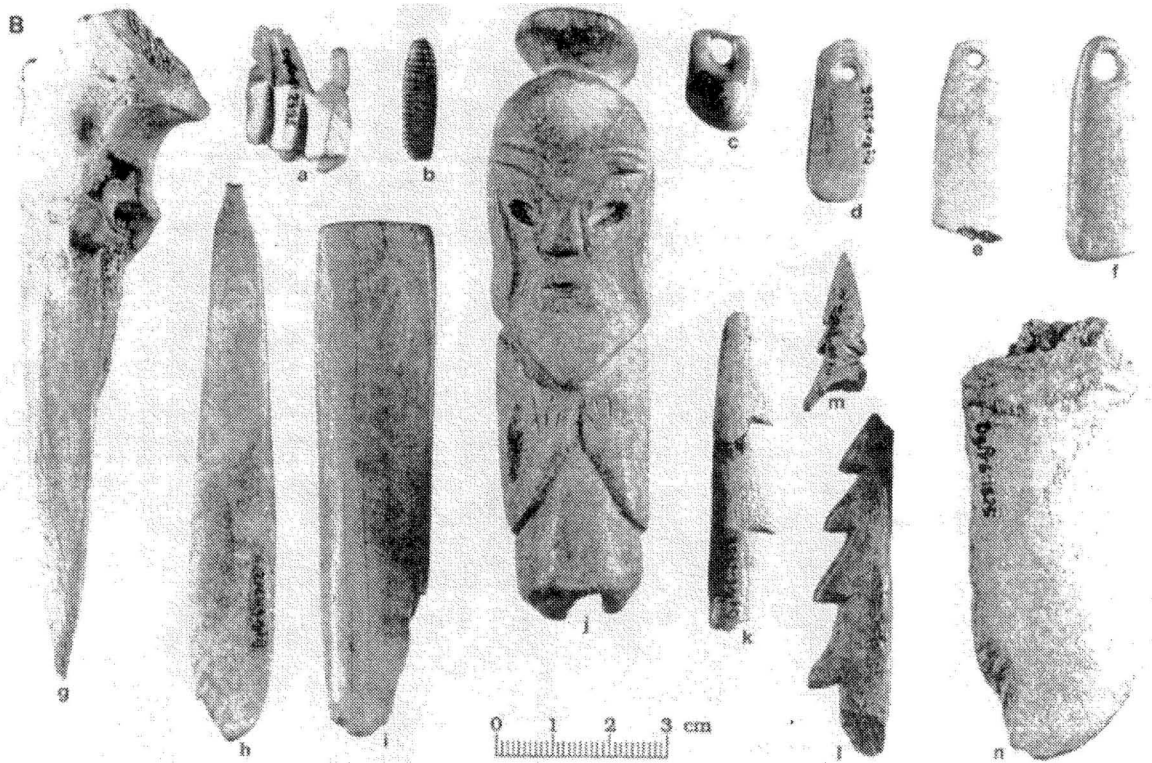


FIGURE 5-3B (*Continued*). (a, c) Tooth pendants; (b) incised 'grub'; (d–f) bone pendants; (g) ulna awl; (h) mammal bone awl; (i) bone wedge/flesher; (j) anthropomorphic antler figure; (k, l) unilaterally barbed antler points; (m) bilaterally barbed harpoon fragment; (n) antler wedge.

large (Glenrose, 800 plus tools, St. Mungo 2200 plus, Crescent Beach 500 plus, excluding beads), these three ground stone categories are indeed most likely absent, or at least very rare in this culture.

Variability in the ground stone industry among these three sites exists in ground stone disk beads. Only 2 were reported from the St. Mungo Glenrose component, although 482 were reported from the overlying Marpole component. These two Glenrose St. Mungo beads were interpreted as being intrusive, because they were found in the screen in the top-most St. Mungo level (Matson, 1976:291). Ham *et al.* (1986) report only 8 beads from their main St. Mungo deposits, yet some 496 are reported by Matson *et al.* (1991) from the Crescent Beach St. Mungo component. It may be that differing excavation techniques are responsible for some of these differences, as Percy (1974) apparently only recovered 12 beads from his main excavations at Crescent Beach, although another 60 were found in the laboratory while cleaning a burial.

The bone pendant category is the most distinctive stylistically (Figure 5-3B), of which 12 were found at Glenrose and 13 at St. Mungo. In contrast, no bone pendant of this style was recovered from Crescent Beach. (The one bone pendant listed for Crescent Beach in Table 5-2 is of a different style.) Crescent Beach, on the other hand, produced a number (6) of distinctive awls made on split mammal rib bones that are not found in the the other two components (Pratt, 1992). Could these differences in beads, awls, and pendants be indicative of ethnicity? Today Glenrose and St. Mungo are in Halkomelen-speaking Coast Salish territory, whereas Crescent Beach is on the edge of Northern Straits-speaking Coast Salish.

A wide range of other bone artifacts are present at the Glenrose and St. Mungo sites, with awls being the most common, along with bone chisels, fleshers, and blades (Figure 5-3B). Although bone bipoints and unipoints are present their numbers are modest compared to their abundance in later times. At Glenrose a rodent incisor tool is present, along with a bird bone tube, tooth pendants, and a single needle.

Although the bone and ground stone artifacts—excepting beads—do not occur in large numbers, this is the first significant occurrence of these two industries, which dominate the assemblages during the last 1500 years on the Northwest Coast. Artifacts made from shell also occur in significant numbers for the first time in St. Mungo. At Glenrose a single adze blade and three other artifacts made from California mussel, as well as 134 very small shell beads associated with a burial were recovered. A number of shell adzes were found at the St. Mungo site, and at least one was recovered from Crescent Beach, along with other mussel shell tools. Only a single shell bead was found in the main deposits at the St. Mungo site, although 95 were found at Crescent Beach by Matson *et al.* (1991).

Antler artifacts make up about 5% of the Glenrose St. Mungo component. These include beam and tine wedges, "punches" and a single bilaterally barbed harpoon fragment. In addition, a single zoomorphic carved antler object was found, which may be a haft (Figure 5-3B, j). A wider range of bilaterally and unilaterally barbed points and harpoons (Figure 5-3B, k—m) is present at St. Mungo but no single type dominates

(Ham *et al.*, 1986). Few antler tools were found at Crescent Beach besides the wedges (Table 5-2).

During this period we first see the artifacts that are associated with the Developed Northwest Coast Pattern, particularly in the ground stone and bone tool types. It is also the first time that artifact types unique to the Northwest Coast, such as bone fleshers and barbed bone points, are noted. Similarly, the subsistence information from the components at St. Mungo, Glenrose, and Crescent Beach demonstrates many similarities between the St. Mungo and later coastal cultures.

A number of burials have been reported from these three St. Mungo components, with the eleven reported from Glenrose (Styles, 1976; Beattie, 1980) perhaps the best known. All relatively intact burials were flexed, and discernable grave goods were limited to small shell disk beads and ocher. No labret wear is evident (see sidebar). This burial pattern contrasts significantly with later patterns.

All three well-reported St. Mungo components have analyzed faunal material (Boehm, 1973; Matson, 1976, 1981; Ham *et al.*, 1986; Matson *et al.*, 1991). The best known of the three, the Glenrose site, shows that the major Old Cordilleran mammals, elk (wapiti), deer, and seal, continue to be important in roughly that order (Imamoto, 1976). The fish remains (Casteel, 1976, Figure 5-4) also show many species continuities with the Old Cordilleran component; salmon was the most important fish, although eulachon,

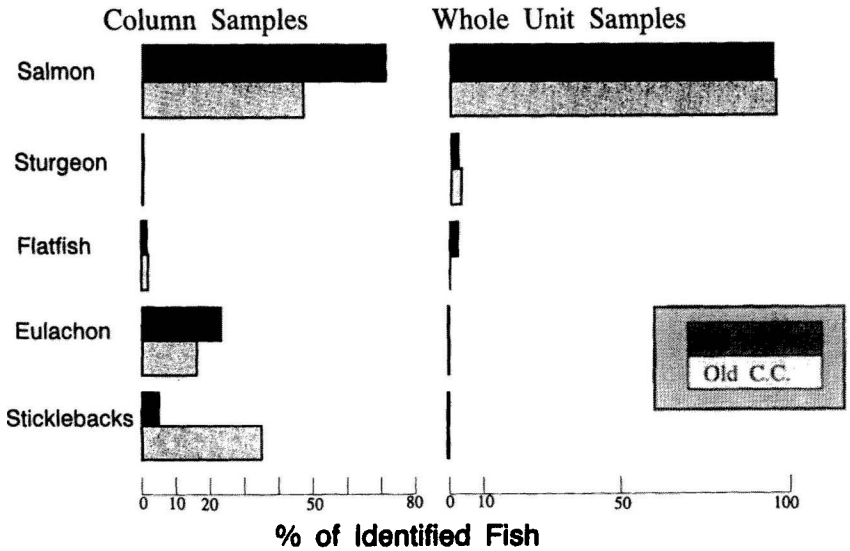


FIGURE 5-4 Glenrose St. Mungo phase fish. St. Mungo and Old Cordilleran components compared. (From Matson, 1992).

starry flounder, and stickleback remains are also present in the column samples. These continuities in faunal remains, however, do not indicate an adaptation similar to the Old Cordilleran, given the much higher density of fish and bay mussel (*Mytilus edulis*) remains, with the latter accounting for up to 40% of the midden by weight (Ham, 1976).

In the Glenrose St. Mungo column samples, relatively abundant salmon cranial parts are present, indicating that freshly procured salmon were processed or consumed at the site. This inference is based on the observation that salmon was usually processed for storage in such a way that only postcranial bones occur with the preserved meat (Boehm, 1973:95). In most situations, only the vertebrae remain with the preserved flesh, so places where only stored salmon are consumed have no salmon cranial parts (Boehm, 1973). Even in places where salmon were processed, cranial parts are less abundant than would be expected on the basis of skeleton frequencies, indicating that many salmon heads are deposited away from midden deposits. In light of these factors, discussed in more detail in a sidebar in Chapter 6, the presence of cranial parts in the St. Mungo component at Glenrose indicates the absence of large-scale storage of salmon, an important feature of the Developed Northwest Coast Pattern economy.

Sticklebacks are rare in the St. Mungo component, probably indicating a relative increase in emphasis on salmon and, to a lesser degree, starry flounder. The lower Fraser River has abundant salmon, but not starry flounder, which usually inhabit shallow waters with soft bottoms (see sidebar Chapter 2). During the St. Mungo Phase, before the Fraser delta had developed to its present extent (Figure 5-1, 4-4; Hebda, 1977; Williams, 1988), starry flounder were probably abundant in environments similar to the present Boundary Bay, and these locations were closer to the St. Mungo and Glenrose sites than they are today.

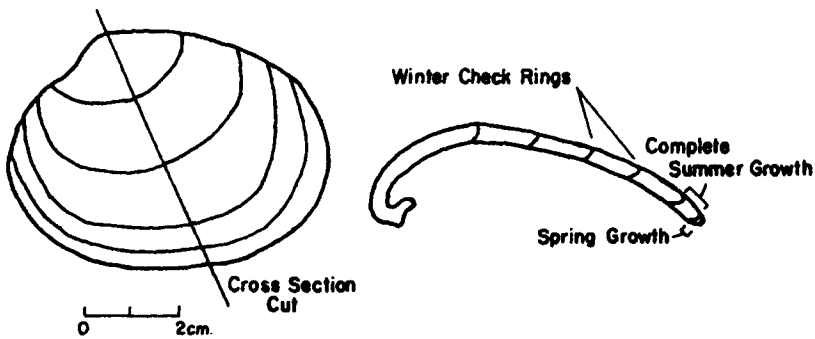


FIGURE 5-5 Shellfish cross-section showing winter check rings.

In contrast to the Old Cordilleran component, the St. Mungo component subsistence pattern at Glenrose is clearly based on coastal and riverine resources—shellfish and fish. The shellfish alone appear to be more important than all the mammals combined (Ham, 1976:52; Matson, 1981). Matson (1976:96, 1981) believes that fish were at least as important as shellfish. Although the seasonality information, including shellfish seasonality as discussed in the sidebar, indicates several different seasons, Matson (1976, 1981) interprets this pattern as the result of a number of short seasonal occupations over the course of the ca. 1000-year-long duration of this component.

> Determining the season of shellfish harvesting has almost become a small industry in the Northwest Coast. Typically, shellfish in or near the intertidal zone retract the mantle at each tide. Because the mantle lays down the shell, the retraction results in a series of "growth rings" recording the tides. The thickness of these rings and composition varies with the seasons. In temperate climates the growth rate typically slows during the winter, resulting in a "winter check ring," which, when inspected, consists of many tidal growth rings (Figure 5-5). This information has been used by archaeologists to measure the amount of growth since the winter check ring to see what season the shellfish was harvested.
>
> Weide's (1969) account of an archaeological application using Pismo clams at a site near Los Angeles initiated the use of this technique in the Northwest Coast. Ham (1976), Ham and Irvine (1975), Keen (1975), and Monks (1977) all used variants of the techniques suggested by Weide to analyze Gulf of Georgia shellfish. This procedure can be as simple as looking for the winter check ring on the outside of the shell, and measuring the growth to the lip of the shell with calipers, and comparing this measurement with an average measurement between winter check rings (bay mussel and rock cockle). Usually, though, it involves sectioning a clam with a band saw, imbedding the section in a plastic matrix, cutting this with a band saw, polishing it, and then inspecting it, and measuring it using a low-power binocular microscrope (Ham and Irvine, 1975). The littleneck clam is a popular choice for this technique, as its edges are usually intact, and its rings are usually visible, although other clams can also be used. Horse clams, though, usually have broken edges so they have not been used.
>
> In some cases the results of these analyses are very definite. In other cases, though, the rings are not clear, and the seasonality is anything but certain. Problems include using older clams (senile) who no longer lay down regular growth rings, and disturbance rings, which look like winter check rings but are caused by storms or other factors. As with other techniques, there are limitations to shellfish seasonality, but used carefully it is a very valuable addition to the analytical tools used by Northwest Coast archaeologists.

As might be expected, much of the more recently obtained subsistence evidence from the nearby site of St. Mungo is similar to that reported above.

Perhaps the most significant difference, reported in the sidebar on the fish remains, is the presence of small amounts of herring, evidence of which was not recovered from the St. Mungo component at Glenrose.

As at Glenrose, Ham *et al.* (1986: 121–122) report that bay mussel was the most important shellfish at the St. Mungo site, along with lesser amounts of barnacles, and no clam occurring in amounts greater than 1% of the total shellfish weight. The mammalian remains found at St. Mungo by Ham *et al.* show elk is the most important by far, followed by deer and seal—the same distribution found at Glenrose. More bird remains, however, were found at St. Mungo than at Glenrose, a pattern also reported by Boehm (1973), with geese and duck occurring in the largest numbers.

Ham *et al.* (1986:124) found that salmon were the most important fish at St. Mungo, accounting for 51% of identified fish. They also report a consistent presence of cranial parts, in accord with the results from

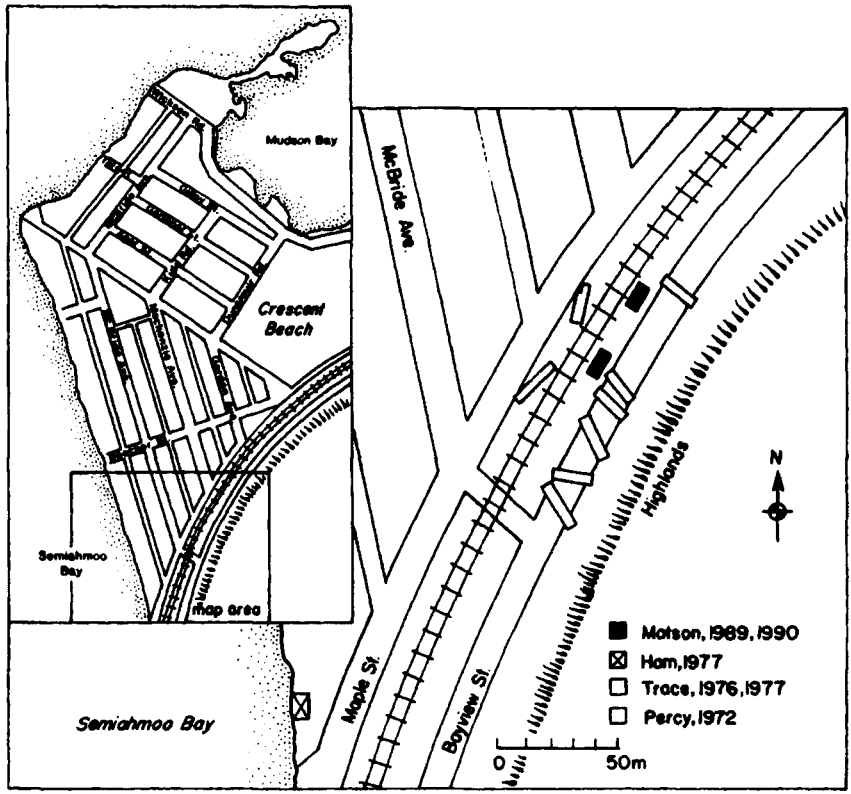


FIGURE 5-6 The Crescent Beach site showing locations of various excavations.

Glenrose, indicating the fish were being caught and eaten there. Second in abundance was starry flounder (21%), with sturgeon (7%) and eulachon (5%) being of lesser importance. The small sticklebacks made up 5% of identified fish, although Ham *et al.* (1986:125) argue that these may have arrived at the site in the stomachs of other fish. No other fish averages as much as 3% of the four clear St. Mungo proveniences analyzed by Ham. Herring, though, does occur in all four samples, at the rates of 0.5, 0.4, 3, and 5%, in contrast with its absence from St. Mungo component samples from Glenrose. Although modest, these numbers presage much larger numbers in later periods.

Ham *et al.* (1986:192–193) have an idiosyncratic argument that the St. Mungo site was occupied for two seasons, a prefreshet period in late spring, perhaps beginning in mid-May for a few weeks, and a longer period from the first of August to September or October. A more conventional interpretation would be that the faunal remains indicate occupation possibly during late winter (herring), and definitely during spring (eulachon and flatfish), and late summer, early fall (salmon head bones).

The most recent analysis of St. Mungo subsistence patterns has been carried out at the Crescent Beach site (Figure 5-6) (Matson *et al.*; 1991; Matson, 1992). The large mammal remains include relatively fewer elk in comparison with Glenrose and St. Mungo, reflecting its more coastal setting. The bird remains are dominated by ducks and geese (Crockford, 1991). The shellfish remains, not surprisingly, are dominated by the bay mussels (Rankin, 1991). Like St. Mungo and Glenrose, some parts of the excavated site consisted of concentrated mussel-shell midden, but other parts were composed of thin layers without much shell but with good faunal preservation. Barnacle was also present, but in relatively low numbers. Only small amounts of other shellfish were found in this component, although individual samples contained rock cockle (*Clinocardium nuttallii*) and littleneck (*Protothaca staminea*) clams, both of which can be obtained today within a kilometer of the site.

Among the fish remains (Table 5-3B), the seven separate St. Mungo layers from the South Trench excavation averaged 52.3% salmon (of the identified fish), whereas the North Trench (Table 5-3A) excavation averaged only 40.7% from seven samples. At Crescent Beach the North Trench St. Mungo layers are generally older than those of the South Trench, thus indicating that the use of salmon increased through time. This inference is supported by inspecting the trend in the South Trench St. Mungo layers (Table 5-3), where the deepest layer has 40.8% salmon, and the top two (denoted CV and CV ash) have 61.6 and 65.6%. Salmon, then, is the most important fish at Crescent Beach, and increases in importance through time within the component.

Unlike samples from later layers, salmon cranial parts are also present in most, but not all, St. Mungo samples at Crescent Beach (Crockford and

TABLE 5-3A Crescent Beach North Trench St. Mungo Fish Remains*

Layer/Level	Salmon	Sturgeon	Sucker/chub	Flatfish	Sculpin	Midshipman	Herring	Dogfish	Skate	Perch	Stickleback	Total
BC-I 200-210	70	6	23	251	83	1	16	12	1	2	0	465
BC-I 210-220	262	1	49	213	34	2	31	13	1	2	1	609
BC-I 220-230 (i)	786	6	140	305	66	10	54	21	1	0	0	1389
BC-I 230-240	112	8	30	80	10	1	2	14	0	1	0	258
BC-I 240-250	101	2	37	76	3	0	0	8	0	0	0	227
BC-I 250-260	94	1	13	60	3	0	0	2	0	0	0	173
BC-I 260-280	30	4	14	16	1	0	0	0	0	0	0	65
Totals	1455	28	306	1001	200	14	103	70	3	5	1	3186

*All values are number of identified specimens (NISP); fish remains are from Units FNW and FSW.

TABLE 5-3B Crescent Beach South Trench St. Mungo Fish Remains*

Natural layer	Salmon	Sturgeon	Chub/ sucker	Flatfish	Sculpin	Midshipman	Herring	Dogfish	Skate	Perch	Eulachon	Greenling	Total
CV	278	0	1	135	5	3	24	4	0	1	0	0	451
CV (ash)	116	0	0	39	0	0	19	2	0	0	0	0	176
CW	316	1	6	110	13	4	79	0	0	2	0	0	531
CX	622	6	6	600	34	3	97	12	0	1	0	0	1381
CX-1	2151	5	21	1879	162	6	313	56	2	6	5	1	4607
CX-2	671	0	9	506	84	8	132	17	0	1	0	0	1428
CY	802	0	31	845	111	0	111	60	1	3	2	1	1967
Total	4956	12	74	4114	409	24	775	151	3	14	7	2	10541

*All values are number of identified specimens (NISP).

Wigen, 1991) indicating that fresh salmon were being processed in most St. Mungo phase occupations. Unlike St. Mungo and Glenrose, Crescent Beach is not located in an area with concentrated salmon resources today, although the adjacent Nicomekl River does have a modest salmon run, and Fraser River sockeye do circle through Boundary Bay before they run up the Fraser River at the end of summer.

The second most important fish from Crescent Beach is starry flounder, which made up 33% of identified fish remains in the South Trench and 30% in the North Trench. Starry founder is abundant today in the adjacent shallow waters of Boundary Bay (Figure 5-1), particularly in the spring when it goes inshore where it can be speared or fished with hook and line.

In addition to the two most important fish species, a wide variety of other fish are found in the St. Mungo phase layers (Tables 5-3A, B). These include low numbers of sturgeon, sucker, sculpin, midshipman, dogfish, perch, eulachon, greenling and modest numbers of herring. Herring rise to a peak of 9% in layer CX-2 in the South Trench, indicating an occupation during the February to April spawning season, a period of peak herring availability in British Columbia (Hart, 1973:97).

The wide range of seasonal indicators at Crescent Beach allows several different interpretations. The presence of relatively abundant salmon head bones supports an occupation during late summer and fall when salmon were running. The large numbers of flatfish and midshipman, and the sparse eulachon indicates site use during spring and early summer, and the herring points to an occupation during late winter and early spring. Some of the bird and mammal remains support this broad range. This distribution of indicated seasonality contrasts with the later occupations at Crescent Beach, which were clearly concentrated in the spring and early summer. As at Glenrose, there are two alternative interpretations: during the St. Mungo phase this site was regularly occupied year-round, or that the site was occupied at various seasons at different times. In the absence of structural remains that would support an occupation regularly for many months at a time, (evidence of a structure is present from at least one later layer), a sporadic occupation at various times of the year is the most likely. In spite of rather different faunal remains, this interpretation is consistent with the faunal remains from the St. Mungo and Glenrose sites.

The wide range of fish resources and seasonality found at Crescent Beach is consistent with a "broad niche" adaptation in Christenson's (1980) general evolutionary terms, or, an unspecialized adaptation to local resources in G. Frederick's (pers. comm.; Hebda and Frederick, 1990:337) evaluation of the St. Mungo phase. In this kind of "forager" adaptation, a wide range of resources are used in a pattern where one moves the base camp to the available resource so that each resource is consumed at its source. This is contrasted with the "collector" strategy (Binford, 1980) in which resources, often storable ones, are collected at specialized procure-

ment and processing sites and are then transported to a base camp. The Developed Northwest Coast Pattern economy, dependent on intensive fish processing and storage, is the epitome of the collector strategy. Although many of the same resources were used in the St. Mungo phase and in early historic times, the economies appear to be quite different, as G. Frederick has noted.

Mayne Phase

Another member of the Charles culture is the Mayne phase, defined at the same time that the first excavations at St. Mungo were reported (R. Carlson, 1970, 1975). The Mayne phase overlaps in time with the St. Mungo, but has been suggested to have slightly earlier starting dates. It was defined on the basis of partially reported excavations at the Helen Point site on Mayne Island, one the Gulf Islands (R. Carlson, 1970, 1975; McMurdo, 1974). The Mayne phase is distinguished from the St. Mungo phase by the presence of microblades, ground slate knives, and labrets (see sidebar). These items are all present in the succeeding Locarno Beach phase (Matson, 1987). Perhaps for this reason, Mitchell (1971b:57) includes the Mayne phase, as originally defined, as part of the succeeding Locarno Beach phase.

Although it was not recognized at the time (R. Carlson, 1970), the eastern portion of the Helen Point site, which has the Mayne component, also contains a Locarno Beach phase component. This later component is definitely present in another excavation in the western portions of the Helen Point site where the Mayne Phase component is just barely discernible (McMurdo, 1974; R. Carlson, per. comm.). The question becomes whether the three artifactual differences between St. Mungo and Mayne simply reflect intermixtures from the Locarno Beach phase component. A recent analysis (Pratt, 1992) indicates that the Mayne phase component reported by R. Carlson (1975) is very similar to Locarno Beach components, indicating that the Mayne phase component at the Helen Point site is largely a Locarno Beach component. A labret, however, has also been reported from an apparently transitional St. Mungo–Locarno Beach component at St. Mungo (Block C, Ham *et al.*, 1986), as have microbladelike flakes from the upper layers of the St. Mungo component at Glenrose. As well, three ground stone fragments, although not of slate, appear to belong to the artifact type "ground slate knife" are also reported from the top portions of the St. Mungo component at Glenrose. Matson (1976:286–287), however, argued that because these ground slate knife fragments are small, found in the screens, and from the top-most St. Mungo levels, they are intrusive from the succeeding Marpole component, where ground slate knives are relatively abundant. Although these three artifact types that distinguish the Mayne from the St. Mungo Phase are not found in "good"

St. Mungo contexts or components, there is some evidence that they may be present in the terminal aspects of this phase.

R. Carlson (pers. comm.) is no longer certain that there is a significant difference between the St. Mungo and Mayne phases. If, however, these three items are present in the Mayne phase—and generally in island components at this time—this may be a clue to the development of the succeeding Locarno Beach phase. It may well be that the Locarno Beach adaptation occurred first in an island setting and only later came to the mainland, which would fit aspects of the original definition of the Mayne phase (Matson, 1989).

> There is some interesting burial evidence that supports the possible presence of labrets well before the Locarno Beach phase. This evidence comes mainly from the Pender Island site, which, though mainly occupied during the last 3500 years, does have some earlier burials (Carlson, 1986). A burial dated at 5150 BP is said to show labret wear (Carlson, 1986, 1991b; Cybulski, 1991). Furthermore, work at the Tsawwassen site (Curtin, 1991) recovered two burials that are also thought to show labret wear and to date to the St. Mungo phase. One burial (D-48) is directly dated to 3500 ± 60 BP (Beta 39228), in the transition between St. Mungo and the succeeding Locarno Beach phase (Curtin, 1991:269). The other burial, D-16, does have a St. Mungo date (3800 ± 60 BP Beta 38354), but the only cranial remains recovered were a lower right mandible and the premolars and molars on that side (Curtin, 1991:219). Labret wear was interpreted on the first premolar. This is simply not definitive enough, given the absence of other teeth and the possibility of "labret facets" developing through dental wear as a result of poor bites (Cybulski, 1991). Since labret wear is difficult to identify, full, descriptive reports are necessary.
>
> If these or other identifications of labret wear are confirmed, the question of absence of labrets in St. Mungo components will remain. Because a substantial number of burials have been examined from this period that do not have labret wear, and because labrets are found at the Glenrose, St. Mungo, and Crescent Beach sites in later, smaller components but not in the St. Mungo components, labrets of the sort found later are clearly not a common part of the St. Mungo culture. One solution to this paradox may be that labrets were only occasionally adopted by individuals during this time period and that the labrets used were made of organic materials rather than from stone and bone as found in later cultures (Bernick, pers. comm.).

Obviously, a number of questions remain about the Mayne–St. Mungo relationships. These include the possibility that there is not a significant difference, that there is an island–mainland dichotomy, and that labrets are more abundant at this time period than current evidence indicates (see sidebar). These questions become more important when the origins of the subsequent Locarno Beach phase are discussed in the following chapter.

A number of other Gulf of Georgia sites have components that are said to broadly fit the "Charles" culture, but current reports do not provide enough information to do more than to add to the list of sites with indications of this stage. These are listed in Table 5-1. In addition, at least three sites have been reported north of Bellingham, Washington, that appear to date from this time and have broadly St. Mungo characteristics (Larsen and Grabert, 1975; Grabert, 1979).

Earlier we had referred to Borden's (1975) definition of the Charles culture, which included the St. Mungo, Mayne, and Eayem phases. Having reviewed the first two, we now briefly turn to the inland Eayem phase. The Eayem phase was defined at the Esilao site, adjacent to the Milliken site at the entrance to the Fraser River canyon (Borden, 1975). Being an inland manifestation, faunal remains and bone and antler tools are not preserved, and the type site Eayem component has not been described in detail. The available information from the Esilao site indicates a similar lithic technology and time span to the well-described St. Mungo components (Borden, 1975). Two other Eayem components are also reported from the lower Fraser valley, the Maurer site, and Hatzic Rock. The Maurer site, located near Agassiz, has dates overlapping with those from the St. Mungo Phase, a broadly similar lithic tool assemblage and two anomalous occurrences, microblades, and a large, rectangular house structure (LeClair, 1976). Given that microblades have not been found at any other Charles culture component, and that the house structure appears to be more similar to what one would expect at a much more recent component than one of this age, questions exist about the nature of this assemblage. The more recently excavated Hatzic Rock site, near Mission, however, does not appear to have these drawbacks. Here the component dates to 4500 BP, and the tools are very similar to the lithic assemblages found at St. Mungo components (Mason, 1994). Also in the basal levels of this site is at least one structure of approximately 40 sq. m outlined by postholes, and of a form apparently unknown in ethnographic times (Mason, 1994). The various evidence from these three sites supports Borden's inclusion of the Eayem phase into the Charles culture, but with the exception of the Hatzic Rock structure, this inclusion adds little information beyond extending the geographical range of this culture.

The Marymoor site, near Seattle shows a number of similarities with the Charles culture (Greengo, 1970). Although lacking both ground stone and an analysis of faunal remains, the culture present at the Marymoor site appears to be a descendant of the Old Cordilleran with broad similarities to St. Mungo. Also present in this site are quartz microliths and microblades, although they appear to be from more recent layers, a pattern seen also in the Gulf of Georgia. The Marymoor site extends the range of the Charles-like culture.

South Coast

Further south along the Oregon coast are a number of sites that appear to have an adaptation similar to the Charles culture, and probably overlap in age. These have been termed *bluff sites* by Ross (1984) because most are located on bluffs overlooking the coast. Lyman and Ross (1988) include them in a stage called "early littoral" on the Oregon coast, which appears to have a coastal adaptation similar to the St. Mungo phase and for which they suggest dates from ca. 5500 BP to 2000 BP. Stemmed projectile points and a single radiocarbon date, (2750 ± 55 BP, DIC 1911, Ross, 1984) are reported from the Blacklock Bluff site. A single radiocarbon date of 2260 ± 210 BP (I4006) is also reported from a layer (Gould, 1966, 1978) with large, stemmed points at the Point St. George site also situated on top of a bluff in northern California. No faunal remains are associated with this component of chipped stone tools. The lack of faunal remains, including shell, is typical of bluff sites. The stemmed point style follows the Old Cordilleran culture at a number of sites, including the Marial site, and so must indicate a date within the last 5000 years.

Full faunal and artifact analyses are only reported for Yaquina Head (Minor *et al.*, 1987) and the Tahkenitch Landing site (Minor and Toepel, 1986), both of which are located along the central Oregon coast (Figure 5-7). The site at Yaquina Head (35LNC62) has 9 of 10 radiocarbon assays in artifact-bearing strata dating between 3400 and 2670 BP. (Three earlier dates from Stratum 3 are largely irrelevant, because only a single "tool," a core was found in it.) This site is found on the top of a bluff, but includes a shell midden layer. A total of 144 tools were recovered of which 72 were lithic, including flake tools, cobble tools, and hammerstones. An unusual number (47) of abrasive stones were found, along with 25 bone, antler, and shell tools. There are also two pieces of decorated bone, including a large piece of whale bone found in association with a burial. In general, the artifact assemblage is similar to St. Mungo material.

In terms of subsistence remains, approximately half of the artifact-bearing deposit was a dense California mussel midden that included small amounts of clams (*Clinocardium nuttallii, Protothaca staminea,* and *Saxidomus giganteus*). Among land mammal remains deer and elk are the most abundant, although dog, mink, hares or rabbits, and beaver remains were also identified. A wide range of sea mammals was identified, including California sea lion, Steller sea lion, northern fur seal, sea otter, and whale. No particular sea mammal appears to have been the focus of procurement. The most common fish remains were hake (*Merluccius productus*), but more than a 100 specimens of herring, surf perches, and greenling remains were also identified in a 1200-specimen sample. A wide variety of other fish were present, including other perches, sculpin, rockfish (*Sebastes* spp.), tomcod, flatfish (including starry flounder and halibut), lingcod, and rat fish.

Salmon was also present but represented by only 16 possible elements. A wide variety of bird remains were also reported. This wide range of resources clearly indicates a broad-based adaptation, similar to that suggested for the St. Mungo phase by G. Frederick, as discussed previously. The faunal analyses indicate procurement year-round, but with an emphasis on spring supporting such an interpretation.

A feature interpreted as a housepit is also present at this site, but likely dates to a later time. The site at Yaquina Head, and somewhat similar material from Tahkenitch Landing (see sidebar), show an adaptation to coastal resources by 3000 BP similar to that seen during the St. Mungo phase in the Gulf of Georgia, and one without an emphasis on salmon. Two fully reported sites with abundant faunal remains are a small sample, but because the first one was only reported in 1986, we can expect that eventually additional similar components will be recognized on the south coast.

The Tahkenitch Landing site, introduced in the last chapter, is located north of Coos Bay (Minor and Toepel, 1986). The oldest component consists of a sandy, shell-less matrix, with only seven artifacts present, and two associated radiocarbon dates of more than 6000 years. The first dense shell is found in stratum 4B, which has a radiocarbon date of 5100 ± 70 BP (Beta 14869), and again only seven undiagnostic artifacts. It has a vertebrate faunal pattern of abundant duck remains and sparse harbor and eared seals, similar to the older occupation, but with more abundant fish remains. The fish remains are very similar to the broad range found in the larger samples described below from Stratum 2B. Shell remains were quantified from two 10 × 10 × 10-cm column samples, and show bay mussel, bent-nose clam (*Macoma nasuta*), rock cockle, littleneck clam, and horse clam (*Tresus* spp.). This shellfish pattern differs from the general pattern seen further north in the abundance of clams present. Stratum 4B may really belong with the oldest component but on the basis of seven nondiagnostic artifacts who can say?

The main occupation of the site is in Stratum 2B, which has four radiocarbon dates which, when averaged according to Berry's (1982) procedure, give a date of 3149 ± 35 BP, and has the largest artifact assemblage, 79 items. Three of the artifacts are *Olivella* shell beads, and 29 are clam shell disk beads. Among the 18 chipped stone tools are six biface fragments, two of which are leaf-shaped, four hammerstones, and six abrasive stones. Two clay spheroids were also present, five bone "wedges," three awls, six bone tube beads, and 12 pieces of miscellaneous worked bones. The leaf-shaped bifaces, bone wedges, and abrasive stones show some general similarities with St. Mungo and with Whale Cove assemblages.

The large total of 17,000 fish remains were recovered from Stratum 2B, 24% of which were identified as Staghorn sculpin, 4% as probable starry flounder, 8% as surf perch, 25% as tomcod, 6% as Pacific hake, 16% as herring, and less than 1% as trout or salmon. This pattern shows remarkable continuity with the earliest remains found at this site. Out of over 300 bird remains, 20% were identified as ducks, but no other

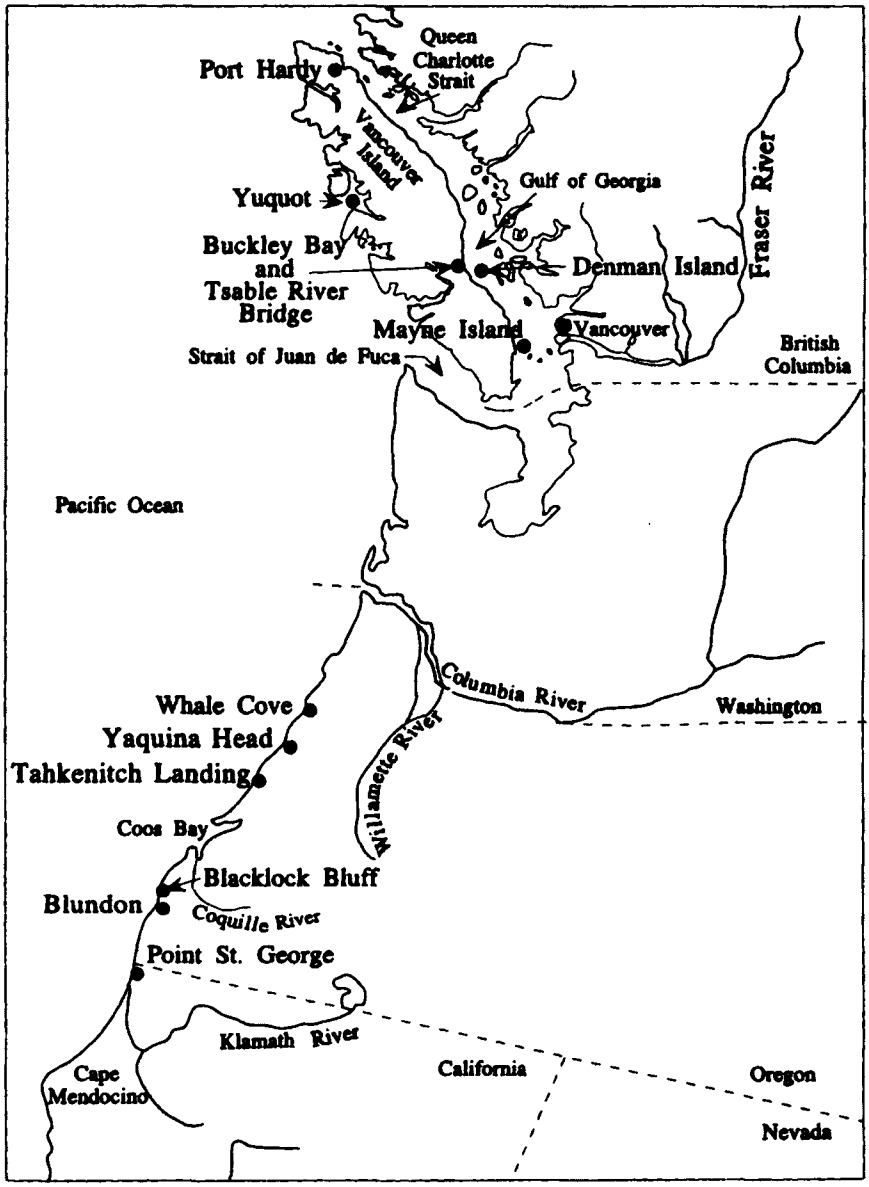


FIGURE 5-7 Locations of early distinctive coastal sites along central and south coasts.

category occurred at more than 4% (loons were 3.9%). Only 20 mammal remains were identified to specific categories, two harbor seals, two fur seals, one dolphin, and 13 elements of the whale family, many of which were found in a single cluster (Minor and Toepel, 1986:27). Shell remains

were analyzed from three column samples, with rock cockle, bent-nose clam, bay mussel, and horse clam being the most important in terms of weight. The subsistence pattern appears to focus on small fish and aquatic birds present in the estuary, and on the shellfish present in the intertidal zone. The lack of salmon is striking, as is the fit with the St. Mungo phase pattern of a broad, unspecialized subsistence pattern focused on locally available resources.

The general setting of Tahkenitch Landing site, in a valley that was kept open to the sea by rising ocean waters and then closed by ca. 3000 BP, when the sea level stopped rising, is strikingly similar to the situation in southern California, where the La Jollan culture is found at a similar time and setting (Warren *et al.*, 1961). Differences between the two situations include the La Jollan culture focus on shellfish and the development of relatively stagnant lagoons there, whereas the Tahkenitch valley turned into a freshwater lake. How much these differences are the result of the increased precipitation or the dune field present on the Oregon coast is unclear, but the similarities in environmental history at Tahkenitch Landing are closer to southern California than to other places on the Northwest Coast.

In fact, Draper (1988) has placed a number of other less fully reported components along the southern Oregon coast into this stage. He finds eight components (including the Blacklock Bluff site mentioned above) with either lanceolate or corner-notched atlatl points, which he estimates to date minimally 3000–2000 BP and perhaps as early as 4000 BP. This inference is supported, in part, by the dating of the Yaquina Head site (Draper, 1988:340).

Draper classifies six of the eight components as "residential" and the other two as "station" and "nonspecific special purpose" sites. The last two assignments are somewhat suspect as the assemblage from one, the Blundon site (Figure 5-7), is very small, and the other is in private hands. Draper (1988) contrasts the heavy emphasis on residential function found in this stage with that found in later periods, a contrast also seen in the Gulf of Georgia region. He argues that these sites show a complete adaptation to coastal resources, with harpoons, fishing gear, sea mammals, fish, and shellfish all represented, although an emphasis on salmon is not evident.

A third Oregon site, Whale Cove, on the northern portion of the central coast (Figure 5-7), lacks only a complete analysis of fish and shellfish to join the other fully reported components of this stage (Bennett and Lyman, 1991). The component of interest is the earliest one at Whale Cove which has radiocarbon dates of 3010 ± 50 BP (DIC 3257) and 2830 ± 70 BP (Beta 27968). As described in the sidebar, the tool assemblage is similar to others of this stage.

A total of 39 lithic implements are reported from the early component at Whale Cove, including utilized flakes(16), bifaces(2), scrapers(2), stemmed projectile points(2), a chopper, a hammerstone, pieces of shist

> with abraded edges (3), abraders(7), manos(2), a grinding slab, a stone bowl fragment, and a "sphere." Eighty-five bone and antler implements were also recovered—20 pointed bone tools (of which 15 are awls), 4 bipoints, and 15 bone wedge or chisel fragments, a category also common in the St. Mungo phase. A total of four beaver incisors, and five decorative objects, a spoon, a flesher, a tooth pendant, and a bracelet were also found. Four "fish lures" were also present, along with five bird bone artifacts and 32 miscellaneous worked pieces of bone and antler. Finally, 12 *Olivella* shell beads and a drilled *Tresus* spp. (horse clam) fragment were recovered from this component.

The shellfish remains were not analyzed, but apparently consisted of California mussel with some freshwater mussel (*Margaritifera margaritifera*). Likewise, the fish remains were not analyzed though Lyman (1991:267) estimates that less than 5% were of salmon, indicating a nonsalmon economy at this site. A total of 230 identified mammal bones were recovered from this component, with almost all of the 169 land mammal elements being deer and elk. The sea mammal remains showed a wider variety, with 800 pieces of whale, two porpoise vertebrae, seven sea otter elements, nine harbor seals, including some newborns, 18 Steller sea lions, four California sea lions, and 21 northern fur seals.

Draper's review of the southern Oregon coast archaeology, and the three more fully reported sites, present a pattern very similar to that seen in the St. Mungo phase. The Oregon coast pattern differs in that this stage appears to extend to a more recent time, and has less ground stone, although this technology does occur in these relatively small assemblages. Draper's attribution of relatively permanent houses (ca. 4 × 5 m) to this time, is a weak association in our judgment. The culture along the Oregon coast from 2000 to at least 3500 years ago is one clearly adapted to coastal resources, although land mammals were still important. Lyman and Bennett's (1991:276) inference, that this culture represented a "generalist forager lifeway," is consistent with our interpretation of the St. Mungo phase.

Central Coast

Returning to the central coast, Yuquot (Figure 5-7) on the west coast of Vancouver Island, has a component that dates to 4000 BP (Dewhirst, 1980). Surprisingly, this culture has almost no artifact assemblage similarity to the St. Mungo culture, as chipped stone is essentially absent. This early Yuquot culture has not been found elsewhere yet, and no faunal information is available. The range, then, of the Charles culture does not extend north of the Gulf of Georgia. In fact, Mitchell (1988a) has described the Obsidian culture for the Queen Charlotte Strait off northern Vancouver Island as having a very different artifact assemblage from both the Charles culture and Yuquot.

The Obsidian culture (Figure 5-7) is found at two sites at Port Hardy, Bear Cove (C. Carlson, 1979), and O'Connor (Chapman, 1982), as well as at Echo Bay and Hopetown, two sites on the eastern shore of the adjacent Queen Charlotte Strait (Mitchell, 1988a; 1990). Mitchell defines this culture on the basis of the abundance of obsidian lithics (usually small in size) often produced by bipolar technology; large leaf-shaped bifaces, irregular abrasive stones, mussel-shell celts and knives, bone bipoints, and composite toggling harpoon valves. The chipped stone items are said to dominate these assemblages (Figure 5-8).

The five radiocarbon dates associated with this culture (Mitchell, 1988a: 253) all lie between 3000 and 2400 BP. Mitchell (1990:353), however, states that the Obsidian culture probably extends back to 4800 BP. However, the preceding culture in this area is the Old Cordilleran, and if the events in this area were relatively synchronous with events further south, one would not expect the Obsidian culture to begin before 4500 BP. Because of the lack of ground stone material, and the fact that no other culture has yet been found to fit between the Obsidian culture and the Old Cordilleran in this area, we expect that Mitchell is correct in arguing that it dates older than 3000 BP, and is coeval, at least in part, with the Charles culture.

Faunal material analyzed from Obsidian culture components at the Hopetown and Echo Bay sites show a large number of deer (Mitchell, 1988a). Salmon remains from the two sites range from 36 to 52% "calculated on a minimum live weight basis," in contrast to later components at the same two sites which had 73 and 93% salmon. Obsidian culture deposits also had significant numbers of ratfish, dogfish, rockfish, and codfish remains. This diversity of fish remains suggests an adaptation similar to the St. Mungo components.

The Obsidian culture may extend well south along the east coast of Vancouver Island where Eldridge (1987) has reported a site on Denman Island that may belong to this culture. This site has abundant small obsidian tools, only leaf-shaped points among the bifaces, quartz crystal microliths, two ground slate knife fragments, and three ground stone point fragments. Thus this site has characteristics of the Obsidian culture and the Charles culture, and even the succeeding Locarno Beach phase. The only date associated with the Denman Island material is 3500 BP, which may explain its exceptional transitional nature.

The information on the Obsidian culture is not yet sufficient to describe it in detail, or even to date it adequately, but there is enough to indicate that it has similarities to the St. Mungo adaptation—a year-round occupation on the coast, relying on fish and shellfish, but without the distinctive subsistence, social, and artistic characteristics of Developed Northwest Coast Pattern. The absence of ground stone tool technology and the presence of composite harpoon valves are particularly interesting features of this culture.

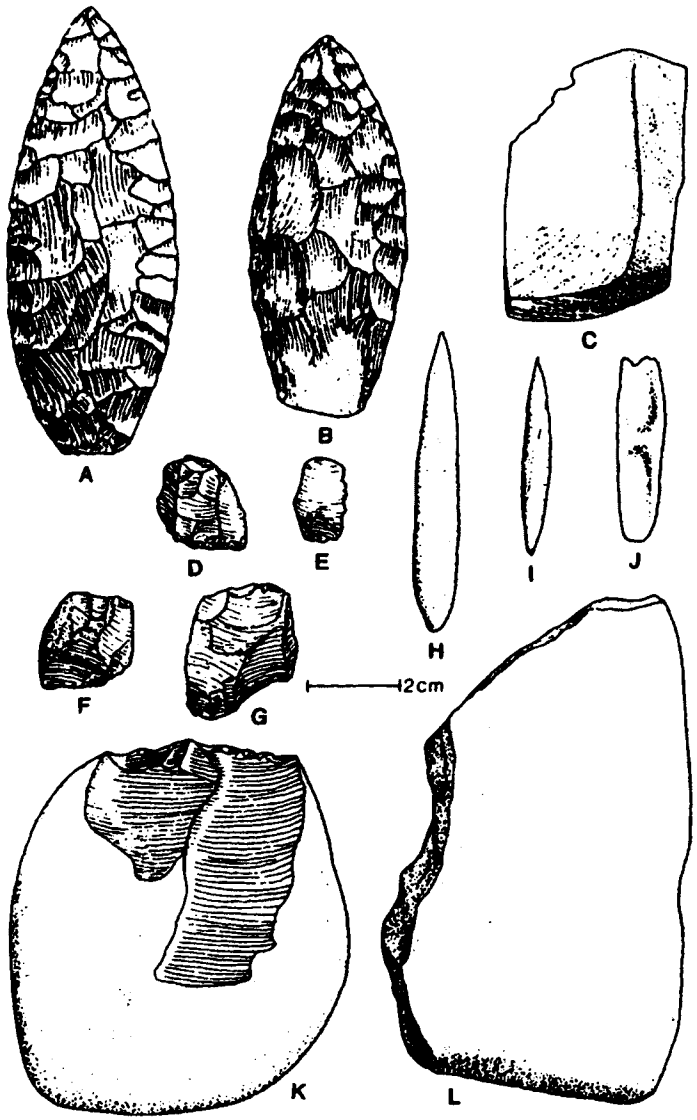


FIGURE 5-8 Obsidian Culture artifacts. (A, B) leaf-shaped bifaces; (C) ground California mussel shell adze blade; (D–G) obsidian bipolar flakes; (H) bone unipoint; (I) bone bipoint; (J) composite toggling harpoon valve; (K) obsidian core; (L) abrasive stone. (From Mitchell, 1988a.)

Summary of the Central and South Coasts

Although the St. Mungo culture is by far the best known, it appears that all the cultures of this adaptive stage along the central part of the Northwest

Coast, with the possible exception of the early Yuquot assemblage, share a number of characteristics. They have abundant chipped stone tools, particularly in comparison with the later almost lithic-free assemblages, but they show, for the first time, substantial bone tool assemblages and, often, the beginnings of a ground stone tool industry. Abrasive stones, used at least for making bone and antler tools, become abundant for the first time.

In contrast with the single previous culture, Old Cordilleran, at least three different cultures are present in the same area, indicating different regional adaptations and, possibly, ethnic groups. The number of sites in the best reported area, the Gulf of Georgia, from a period that lasts no longer than 1200 years, indicates an increase in population density several times that of the initial occupation. Subsistence evidence shows a full-time adaptation to the coast, with shellfish and coastal fish dominating the faunal remains. It is the efficient and extensive use of these resources that undoubtedly allows for the population increase. However, evidence of stored salmon, and for the ethnographic pattern of large winter villages and distinct limited-activity sites is absent for this period. The new discoveries along the Oregon coast indicate that a similar kind of adaptation was present there at a minimum of 3500 years ago.

Contemporaneous complexes further north, however, present a significantly different picture. We turn now to that region.

THE EMERGENCE OF DISTINCTIVE COASTAL CULTURES ON THE NORTH COAST

Unlike the south and central coasts where there is continuity between the Old Cordilleran and subsequent cultures, the relationship on the north coast between the initial North Coast Microblade Tradition and the later coastal cultures of ca. 4500 to 3500 BP is uncertain. On the other hand, the differences between the earlier complexes on the north and south/central coasts—that is, between Old Cordilleran and North Coast Microblade Traditions—no longer holds. Microblades decline by 5000 BP, and are absent entirely from the north coast archaeological record by no later than 4000 BP. In their place is evidence of an emerging ground stone technology, including ground slate tools and abrasive stones, and an expanding bone and antler industry. Like the coast to the south, we see the development of a number of relatively short-lived cultural traditions with restricted regional distributions. The origin of these cultures is poorly understood, possibly in part because of the relatively modest amount of archaeological investigation that has occurred on the north coast, but also because of the striking technological differences that exist between these new cultures and the earlier North Coast Microblade Tradition. Subsistence information is also

relatively limited, with only two detailed analyses—from Hidden Falls and Namu—and a few general analyses reported. Still the archaeological record indicates a development roughly parallel to the south, along with many interesting differences.

The first evidence of coastal settlement in the Prince Rupert Harbour area is found in this period, as well as site components on the Queen Charlotte Islands, in southeastern Alaska, and on the central mainland coast of British Columbia. One of the better documented sequences, however, comes not from the coastal area, but from the middle Skeena River at Kitselas Canyon, where this period is represented by the Gitaus and Skeena phases.

Prince Rupert Harbour

The earliest evidence of human occupation in the Prince Rupert Harbour area (Figure 5-9) dates to just older than 5000 BP (MacDonald and Inglis, 1981:44). This initial settlement marks the beginning of MacDonald's Period III, which lasts until 3500 BP. Of the eleven sites excavated in the Prince Rupert area by the North Coast Prehistory Project (MacDonald and Inglis, 1981:41), only three yielded significant Period III assemblages. The Boardwalk, Lachane (which includes the previously designated Co-op site) and Dodge Island sites all have small Period III components with shallow midden accumulations, although no quantitative information about assemblages is currently available for any site. Two other sites, Kitandach and Ridley Island, are also said to have yielded Period III dates, but few artifacts.

Bone and antler tools predominate in the Period III assemblages. Hunting and fishing implements are represented by bilaterally and unilaterally barbed bone harpoons, fixed bone points, and, more rarely, leaf-shaped chipped stone bifaces (Figure 5-10). Woodworking is reflected in the presence of small bone and antler wedges, shell adze blades made from California mussel and beaver and porcupine incisor tools. It is also true, however, that none of the heavy-duty woodworking tools of later periods—such as grooved stone adzes and hand mauls—are present in Period III components. Pebble tools, abraders, bone awls, and needles complete the list (MacDonald and Inglis, 1981:46–47). Microblades and most ground stone artifacts, except for abrasive stones, are reported to be absent from this period.

Limited faunal analyses have been carried out on samples from the Lachane–Co-op site (Calvert, 1968), Boardwalk (Stewart, 1974, 1977), and Ridley Island (May, 1979). Although small and of uncertain provenience and representativeness, these faunal collections do appear to reflect a generalized pattern of subsistence. Of particular importance is the diversity and overall high proportion of land mammal remains in the Period III

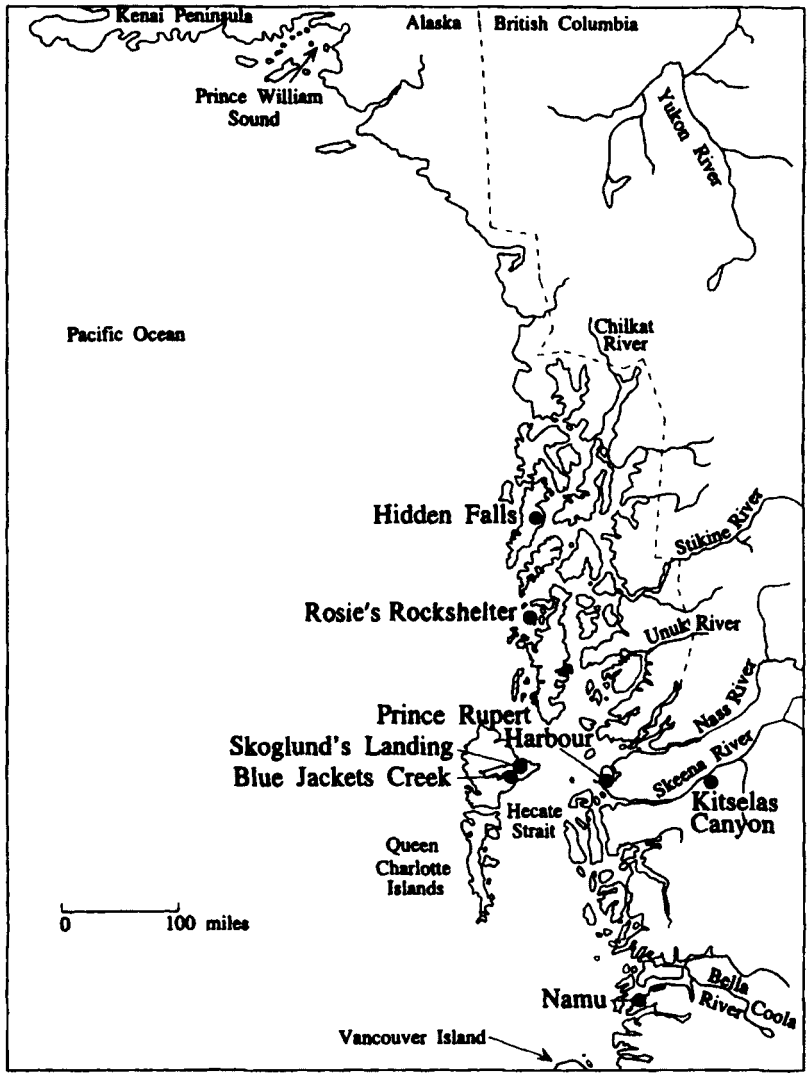


FIGURE 5-9 Early distinctive coastal sites and localities on the North Coast.

components (Calvert, 1968; Stewart, 1974). Coast deer is well represented, as in later periods, but Calvert (1968:96) notes that at Lachane–Co-op, remains of mountain goat, elk, and a variety of small land mammals were only present in Period III. Harbor seals were probably the most important marine mammals followed by Steller sea lions and sea otters. Freshwater and saltwater fish are represented by a diverse group of species. MacDonald and Inglis (1981:57) list 29 taxa from Prince Rupert area sites, most of

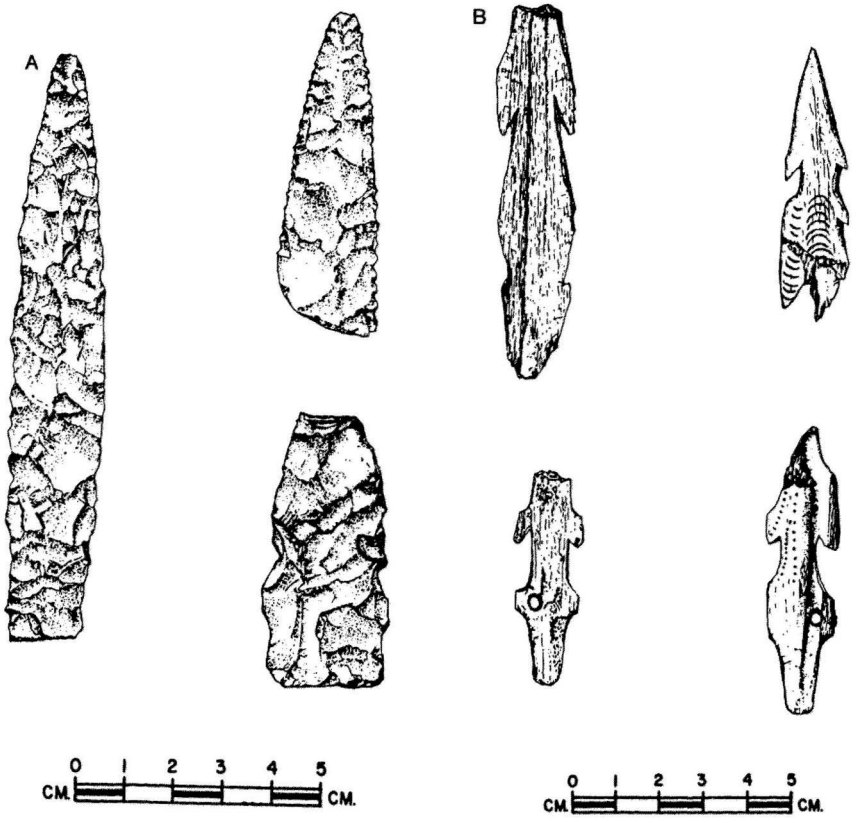


FIGURE 5-10 Rupert Harbour Period III artifacts. (A) basalt bifaces; (B) bilaterally barbed harpoons. (From MacDonald and Inglis, 1981.)

which are present in Period III components. Salmon elements are present in the Period III assemblages, but there is no evidence of intensive processing and storage at this time. The Period III middens are thin and diffuse compared to later periods. As in the south, bay mussel remains are the dominant shellfish present at this stage.

This scanty faunal information from Prince Rupert must be treated with reserve, as these sites were largely excavated in the 1960s when subsistence information was not a common goal of Northwest Coast archaeology. Still, the apparent pattern of resource diversity without specialized production with the focus on coastal resources—although land mammals are still important—is roughly equivalent to the better documented southern material of this stage.

Settlement pattern evidence is minimal for this period. No house depressions or house structures have been recorded. Postholes from the

Boardwalk site are small, averaging about 15 cm in diameter (MacDonald and Inglis, 1981:45), and this evidence, combined with the absence of heavy-duty woodworking tools indicates that large plank houses like those of the European contact period were unknown at this time. This evidence indicates that a small, mobile population occupied the harbor during this period.

Lower Skeena River

The Gitaus phase (Allaire, 1979; Coupland, 1988a:232), 4300 to 3600 BP, is found at Kitselas Canyon some 120 km from the coast (Figure 5-9), and is coeval with Period III components at Prince Rupert Harbour. Gitaus phase components have been identified at Gitaus (Allaire, 1978, 1979) and at the Paul Mason site (Coupland, 1988a) both in Kitselas Canyon. Artifact similarities between the coast and Kitselas Canyon are exhibited in the chipped stone industry. Cobble tools and cortex spalls, present at Prince Rupert Harbour, are abundant in the Gitaus phase (Figure 5-11). Less numerous are ground stone tools, including abraders, rubbed slate points, and stone saws. Leaf-shaped bifaces, like those from Period III components at Prince Rupert, are present, but rare (Figures 5-11, 5-12). Abraders attest to the presence of a bone and antler industry, but we have no way of comparing tool types to the material from Prince Rupert Harbour because of the lack of preservation of bone and antler at Kitselas Canyon. Faunal remains are absent from the Gitaus phase. In the absence of shell middens, which keep the soil acidity near neutral, vertebrate remains do not last long in the humid and acid Northwest Coast soils.

Allaire (1979:46) interpreted the Gitaus phase component at Gitaus as a seasonal summer fishing camp. Artifactual evidence for summer riverine fishing includes numerous cortex spalls, which may have been used as fish knives, birch bark rolls, possibly used as torches for night fisheries, and a carved stone fish effigy (Allaire, 1979:30). The location of these two sites in Kitselas Canyon, the first constriction on the Skeena River and a very important ethnogrpahic fishing location, supports such an interpretation as well. Allaire concludes that the Gitaus phase inhabitants were coastal peoples exploiting the lower Skeena Valley as far east as Kitselas Canyon. An alternate interpretation would be that both areas shared the same culture, but did not involve the same individuals.

The Skeena phase, 3600–3200 BP is a poorly understood culture, known only from inland portions of the Skeena River. It is unclear whether it has any relationship to coastal cultures, or to succeeding cultures in the Kitselas Canyon area. At least two archaeologists (Allaire, 1979; Ives, 1987) interpret this phase as an incursion of interior, possibly Athapaskan-speaking peoples whose way of life was quite different from contemporaneous coastal inhabitants. This culture is briefly described in the sidebar.

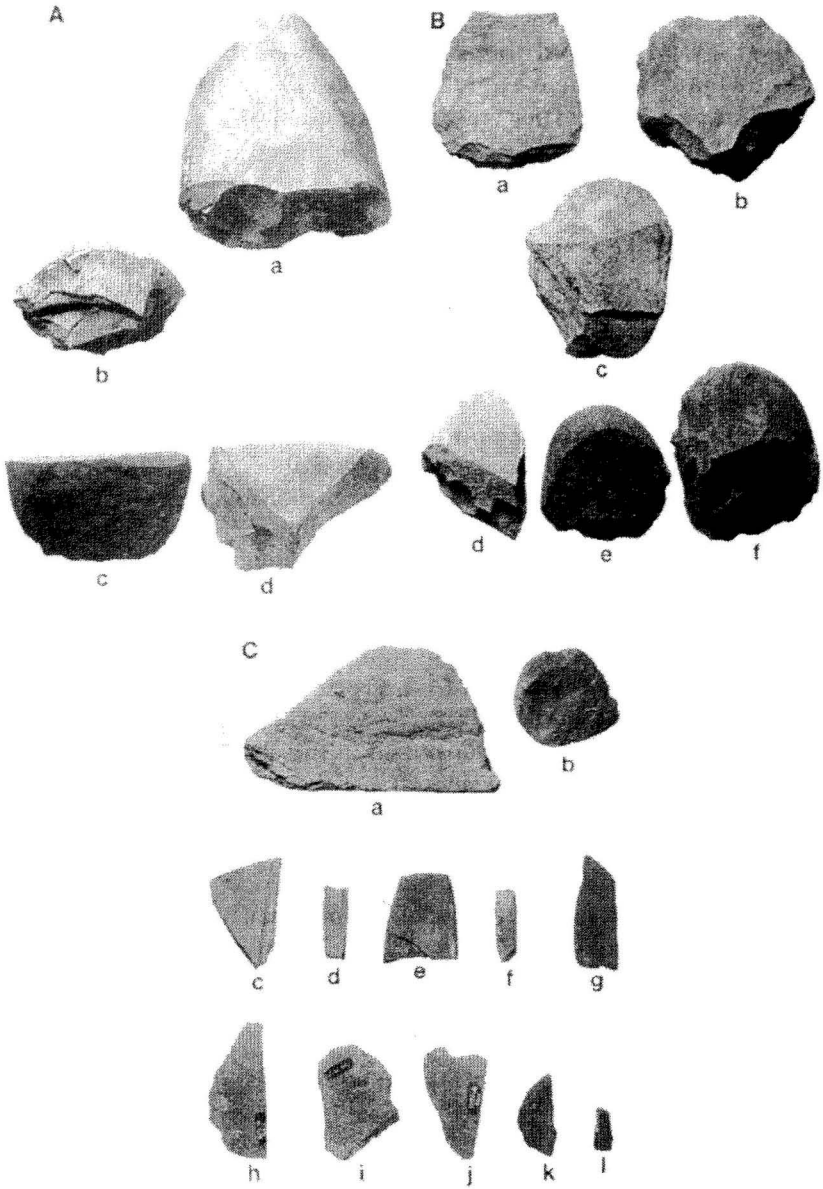


FIGURE 5-11 Gitaus phase artifacts from the Paul Mason site. (A) (a–d) cobble choppers. (B) (a–c) split cobble tools; (d–f) acute angle cobble tools. (C) (a, b) stone saws; (c–d) sawn fragments; (e–g) finished ground slate; (h–l) thin-ground slate fragments with utilized edges. (From Coupland, 1988a.)

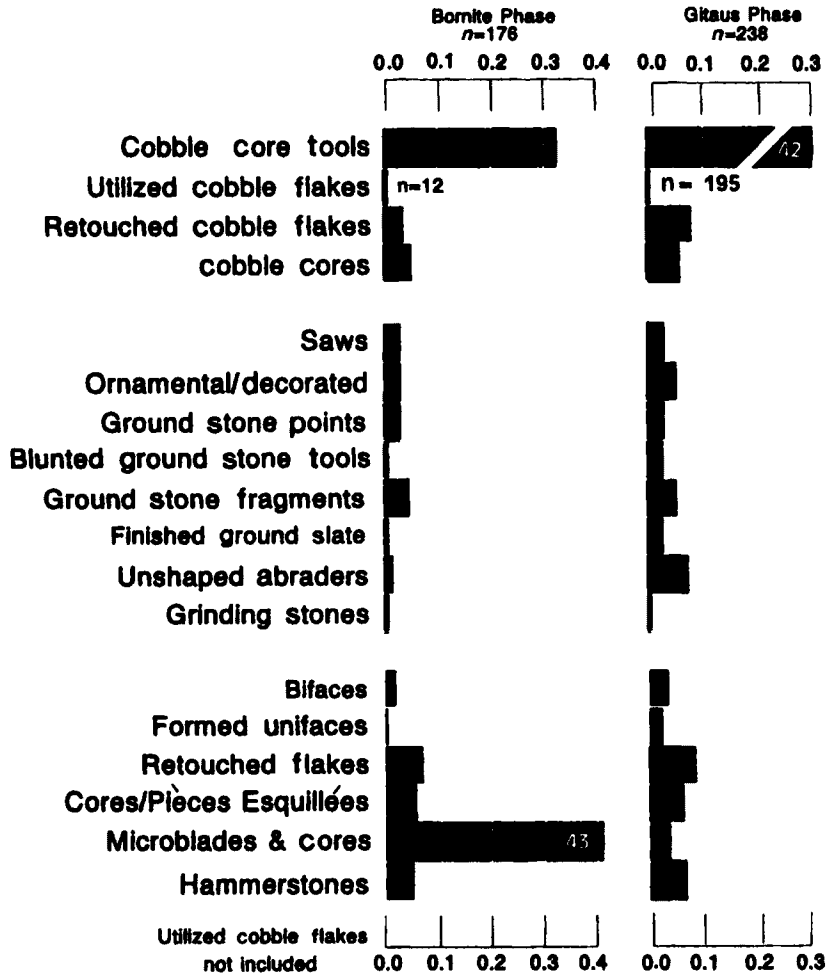


FIGURE 5-12 Gitaus phase component from the Paul Mason site (compared with preceding Bornite Phase.) (From Coupland 1988a.)

The Skeena phase represents a significant technological change along the Skeena River (Coupland, 1988a:234–237), and may represent an interruption of the coastal-lower Skeena settlement system. Skeena phase site components have been identified at Gitaus (Allaire, 1978, 1979) and further upriver at Hagwilget Canyon (Ames, 1979) near the present-day boundary between the Gitksan (Tsimshian) and Carrier (Athapaskan).

The Skeena phase tool assemblage is distinctly different from that of the preceding Gitaus phase, the most notable difference being the increase in proportion of formed chipped stone tools. Leaf-shaped bifaces and distinctive lanceolate projectile points account for almost 17% of the

Skeena phase stone tools compared to only 2% during the Gitaus phase. Increases in bifaces and scrapers are offset by decreases in the proportions of cobble tools and ground stone implements, including abraders. An important shift in the use of raw materials is also seen during the Skeena phase. By the middle of the Skeena phase at Gitaus, 55% of stone tools were manufactured from green chert, a much higher proportion than in the Gitaus phase, when more locally available argillite and basalt were the most commonly used materials.

Southeastern Alaska

The archaeology of this stage in southeastern Alaska is poorly known in contrast to the well-documented earlier archaeological record there. Component II at Hidden Falls (Lightfoot, 1983, 1989), dating from 4600 to 3200 BP provides the best existing information for this time period.

Differences between the Hidden Falls I and II assemblages are consistent with contemporary changes seen elsewhere on the north coast. Microblades are not found in the Hidden Falls II assemblage. The lithic assemblage is equally represented by chipped stone and ground stone tools (Lightfoot, 1989:206–262). Three bone implements, all unilaterally barbed points, were also recovered. The chipped stone industry included relatively few finely made pieces (Table 5-4). Debitage, including cores, accounts for much of the material. No flaked bifaces were recovered. In contrast, the ground stone industry (Figure 5-13) was much more developed and varied. Tool forms include numerous ground points and point fragments, ground stone fragments, adzes and adze preforms, abraders, and knives (Table 5-4). Most ground stone points were made from slate, with the most common form having a laterally constricted blunt base. Less common were forms with thinned bases, stemmed points, and bipoints. Ornamental ground stone artifacts included six medial labrets, 27 talc or serpentinite beads (Figure 5-13), a ribbed stone, and another stone with cross-hatching. The Hidden Falls II ground stone industry is the most highly developed and diversified for this stage anywhere on the Northwest Coast. The ground stone points, labrets, and adzes are as early as any found, and far more numerous, than at any other site of this stage. By 3500 BP, however, towards the end of this component according to the somewhat confusing radiocarbon dates, labrets, ground stone points, and adze blades are present in many other sites, as we will see in Chapter 6.

Some interesting features were found in the Hidden Falls II component. These include two basin-shaped pits, three concentrations of burned rocks and charcoal, interpreted as cooking areas, and an arc of 37 postholes around a 3 × 4-m shallow depression. The latter is interpreted as a structure and is one of the earliest found in a coastal setting. The other features may be associated with food processing.

Hidden Falls II faunal remains (Moss, 1989a:100), although sparse, (probably because of the low shell content hindered preservation [Erlandson, 1989:140]), reflect a broadly based subsistence economy. A single, heavy whale bone was present in this component, but other sea mammals accounted for only 3% by weight of the faunal remains. Land mammals were dominated by deer (42.5% of mammal bone weight). About half of the faunal remains by weight was fish (51.6 g), and about half of it was unidentifiable. Salmon were the most abundant identified fish remains (21% of total fish weight), followed by halibut (16.5%), cod (5.8%), and rockfish (1.6%). Herring (0.6%) was also present, but is probably underrepresented because of the use of a coarse screen size (Moss, 1989a:96). Very little shell was recovered from Component II; that which exists is from mussel and barnacle.

In Component III (Moss, 1989a) cod is seen as an indicator of wintertime occupation, as is salmon, which is represented by vertebrae but no head bones. The same can be argued for Component II, with the addition of herring, which is most abundant in late winter during spawning. The

TABLE 5-4 Hidden Falls II Artifacts*

Artifact type	Number	Percent
Ground stone points		
Bipointed	1	0.3
Stemmed	2	0.6
Blunt base	13	3.9
Thinned base	6	1.8
Fragments	58	17.6
Ground stone, single-edge tools	6	1.8
Ground stone adze blades	30	9.1
Abraders	25	7.6
Labrets	6	1.8
Beads	27	8.2
Ribbed and cross-hatched stones	2	0.6
Ground stone debitage		
Sawn and snapped slate	12	3.6
Ground and polished slate	49	14.8
Ground and polished tuff	24	7.3
Serpentine debitage	12	3.6
Chipped slate tool blanks	9	2.7
Utilized flakes	11	3.3
Retouched flakes	3	0.9
Flake cores	24	7.3
Hammerstones	7	2.1
Unilaterally barbed bone points	3	0.9
Total	330	

*From Lightfoot (1989.)

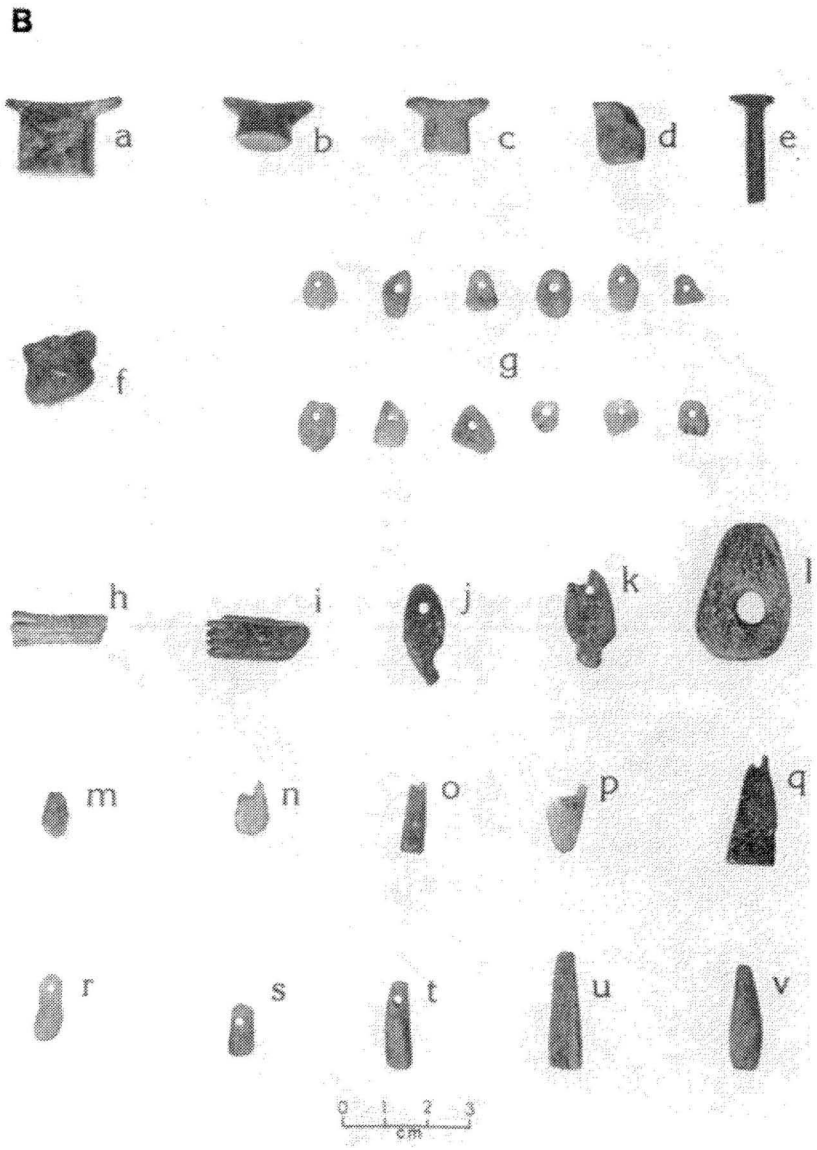


FIGURE 5-13 Hidden Falls Component II artifacts. (A) Ground stone point industry. (B) (a–f) labrets; (g) pebble beads; (h, i) elongate, decorated beads; (j–l) miscellaneous beads; (m–t) pendulous beads; (u, v) pendulous bead preforms. (From Lightfoot, 1989.)

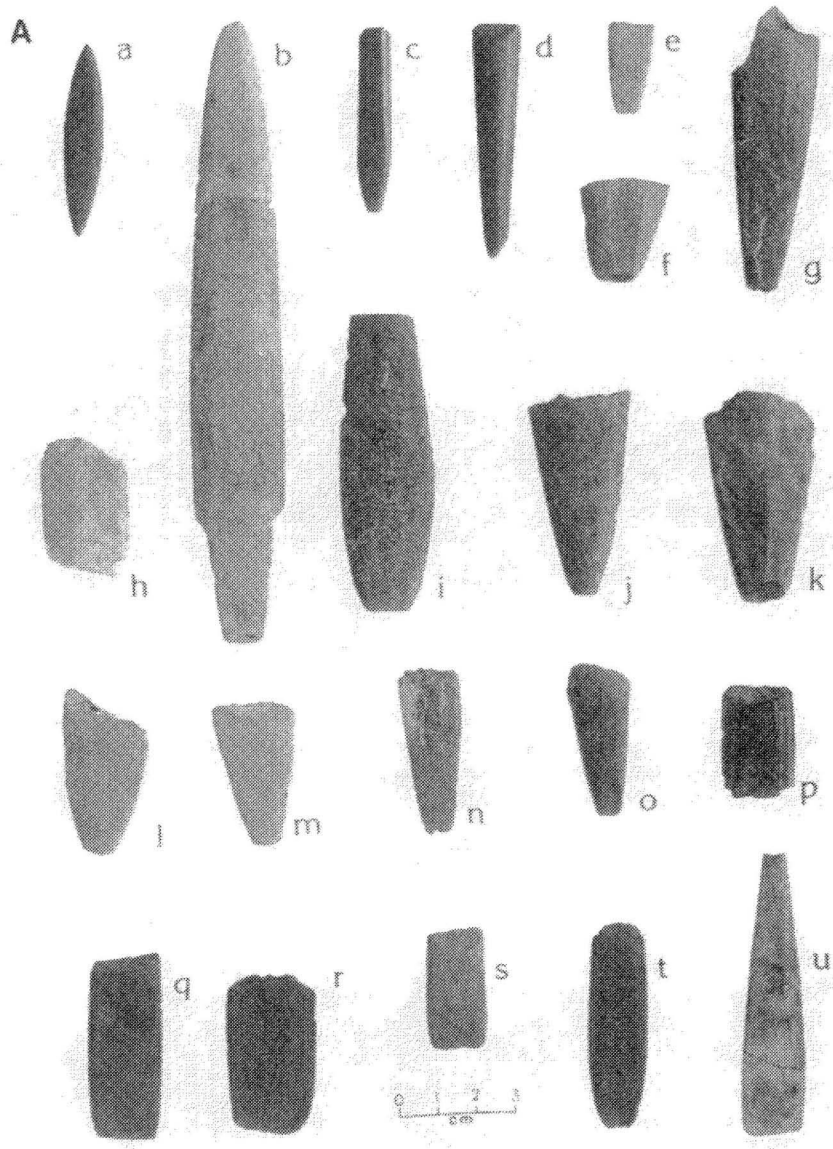


FIGURE 5-13 (*Continued*)

structure found in Component II, then, may well be a winter dwelling housing a single family.

Rosie's Rockshelter, near Chuck Lake on Heceta Island (Figure 4-3) dates to this time period (Ackerman *et al.*, 1985). A total of five radiocarbon

dates have been reported, ranging from 4150 BP (WSU 3238) to 3300 BP (WSU 3237) with four of the five between 4150 (WSU 3238) and 3820 BP (WSU 3236). Averaging all five, or the four most tightly grouped, according to Berry's (1982) procedure results in no significant difference, and the mean using all five is 4,028 ± 44 BP, close to the middle of this adaptive stage on the north coast.

Only a small excavation was carried out, four 1 × 1-m units, and the archaeological material was concentrated in two shell layers, neither more than 15 cm thick. The shell was carefully analyzed and consists of relatively equal amounts of butter clam, littleneck clam, and bay mussel. This distribution indicates use of both rocky foreshores and gravelly sand beds. Only an incomplete analysis of vertebrate remains is published, but it indicates nonsalmonid fish (270) are the most common and no more than 4% are salmon. Only a few land mammal remains were identified, but remains of six different waterfowl classes are recorded (Ackerman *et al.*, 1985:106). Although this sample of faunal remains is small, it is clearly the result of exploiting a variety of niches along the coast.

In contrast with the relatively abundant faunal remains, only eight "artifacts" were recovered—one harpoon head, one bone awl, three hammerstones, one whetstone, a single flake, and a beach pebble manuport, that is, an unmodified object that must have been transported to the site by humans. Of most interest is the bone harpoon, which is as old as any reported for the north coast, and is 8 cm long with two unilateral barbs, and a off-center hole for the harpoon line. Nothing like this is known from the central coast. Also of interest is the almost complete absence of chipped stone.

Queen Charlotte Islands

On the Queen Charlotte Islands, Fladmark (1970a, 1970b, 1975) has defined two distinct, but not entirely dissimilar cultures that begin at about 5000 BP: the Graham tradition and Transitional complex. Both are known from limited archaeological material, and both are marked by the absence of microblades, which distinquishes them from the Moresby tradition.

The Graham tradition is said to last until European contact and is thought to represent cultural developments that are more or less comparable to those happening on the mainland at the same time. These include the appearance of deep shell middens and the additions of bone, antler, and ground stone to the technology. Early evidence of the Graham tradition has been recognized in excavated components at Blue Jackets Creek (Severs, 1974a, 1974b), Honna River (MacDonald, 1969), Tow Hill (Severs, 1975), and the Council site (Severs, 1974b). The key site, Blue Jackets Creek, has a long occupational sequence ranging from 4300 to 2000 BP

(Fladmark, 1971; Severs, 1974a:199), and has yielded large artifact and faunal assemblages as well as human skeletal remains.

Distinctive artifacts found in the Graham tradition include pecked stone, ground stone, bone, and antler artifacts. Small flaked adzes finished by pecking and grinding are found only in Graham tradition components (Fladmark *et al.*, 1990:236). The well-developed bone and antler industry, which accounts for roughly 25% of the artifact assemblage, includes unilaterally barbed harpoons and a bilateral type similar to ones found elsewhere on the north coast mainland. Bone fishhook shanks, not found elsewhere on the northern coastal mainland (Fladmark *et al.*, 1990:237), awls, needles, punches, and barbed bone points are common. Single piece fishhooks occur rarely. Ground slate points and knives also occur in low numbers, as do other ground stone items such as clubs, ribbed stones, and labrets. Most of this material is thought to date about 4000–3500 BP (Fladmark *et al.*, 1990: 237), but the current level of reporting and dating makes this an informed opinion rather than a confirmed observation.

No detailed faunal analysis is available for Blue Jackets Creek, but there is a published list of species, and fish, sea mammal, bird, and land mammal remains are said to occur "in that approximate order of frequency" (Severs, 1974a:198). Sea mammals appear to have been most important in the upper levels of the site. These included sea otter and seals, whereas among the land mammals, caribou, and dogs were noted. Salmon and halibut were identified among the fish remains.

A variety of shellfish was also identified, with butter clams, littlenecks, bay mussels, rock cockles (*Clinocardium nuttallii*), wrinkled whelks (*Thais* (*Nucella*) *lamellosa*), dire whelk (*Searlesia dira*), sea urchins (*Strongylocentrotus* spp.), and limpets (*Acomea* spp.) all well represented. Said to be less common were barnacles (*Balanus* spp.), horse clams, chitons (*Katharina tunicata* and *Cryptochiton stelleri*), and California mussels (Severs, 1974a:197). The bay mussel and sea urchin remains are said to be more abundant in the lower layers (Severs, 1974a:177). If this impression of diversity of shellfish used on the Queen Charlottes as early as 4000 BP is confirmed, it would be in marked contrast to the impression of almost exclusive use of bay mussel on the mainland at the same time, but similar to that reported above for Rosie's Rockshelter on Heceta Island.

One of the most interesting aspects of Blue Jackets Creek was the recovery of 14 human burials representing 25 individuals (Severs, 1974a:193; Fladmark *et al.*, 1990:237). Most of these burials are said to date about 4000 BP, placing them among the earliest recovered from the north coast. All were midden burials, three in an upright sitting position, the rest flexed. Red ocher was used in four burials, and some individuals were interred with grave goods. The wearing of "cheek" labrets is suggested by "buccal abrasion" on the upper and lower premolars and molars of three skeletons. The

variability in treatment of the dead in this burial assemblage may be a reflection of social status differences at Blue Jackets Creek.

A recent study has compared the skeletal biology of the Blue Jackets Creek burial population to other north coast prehistoric human remains from Namu, the Boardwalk site, and Greenville, along the lower Nass River (Cybulski, 1992:112–128). Despite a time range of almost 4000 years, the Namu, Boardwalk, and Greenville samples were similar in analyses based on both metric and nonmetric traits—the latter are considered to be more sensitive to genetic differences. The Blue Jackets Creek population was clearly a distinct entity, so different that

> one could conclude that the sample is biologically unrelated to the others. . . . [The data] do not present an image of a common north coast human biological complex which might have existed in British Columbia for 4,000 or 5,000 years, traceable to historic times. (Cybulski, 1992, p. 128)

In an earlier study, Murray (1981) compared the Blue Jackets Creek material to historic Haida skeletal samples. The results of this univariate analysis showed more differences than similarities. In particular, the Blue Jackets Creek sample showed a tendency to dolichocephaly or "long-headedness," whereas historic Haida and other Northwest Coast groups are predominantly brachycephalic or "round-headed." Cybulski (1990: 56) cautions against interpreting this as evidence of population replacement, however noting that a trend to brachycephaly has been observed in many other parts of the world, "and the northern coast of British Columbia may be no exception."

In summary, the people buried at Blue Jackets Creek may be ancestral to historic Haida despite obvious differences in cranial shape. In any event, the early Queen Charlotte Islands burial population is definitely different from mainland material.

Early Graham tradition settlement patterns, as seen at Blue Jackets Creek and other sites, were probably characterized by mobility. Although no house remains have been found, the accumulation of shell middens suggests that the duration of occupation at this time was longer than during the Moresby tradition. Faunal evidence from Blue Jackets Creek is said to indicate occupation at different times of the year (Fladmark *et al.*, 1990:237).

The early Graham tradition is distinguished from cultural developments on the mainland only in a few respects. Stone tools occur in higher frequency than bone or antler tools on the Queen Charlotte Islands, and sea mammal hunting may also have been relatively more important on the islands. The distinctive character of the Graham tradition relative to mainland prehistory is thought to have been maintained until at least 3000 BP (Fladmark *et al.*, 1990:237). It needs to be remembered, though, that our inability to discriminate between the pre- and post-3500 BP Graham tradi-

tion material because of the lack of detailed reports makes these statements tentative at best.

The Transitional Complex was originally conceived as a short period of intermixture between the Moresby and Graham traditions (Fladmark, 1975:239). Known mainly from deposits at Skoglund's Landing (Zone II) (Fladmark, 1970b) and an upper component at Lawn Point (Fladmark, 1986a), there is now evidence that the Transitional Complex was contemporary with, but distinct from, the Graham tradition, lasting until as late as 2000 BP (Fladmark, 1984; Fladmark *et al.*, 1990:235). Skoglund's Landing II has dates of 4,165 ± 80 (GX 1695) and 2510 ± 85 (S-675) BP (Fladmark, 1971:3, 1989:212), whereas a date from the Lawn Point Transitional component is 2,005 ± 85 (S-678) BP (Fladmark, 1986a:52).

Technologically, the Transitional Complex includes a rather limited assemblage of unifacially retouched basalt flakes, many with convex edges, and pebble core tools. The use of a bipolar reduction technique may have functionally replaced the microblade industry, since the end product of both are regular elongated flakes. Fladmark (1989:216) has commented on the overall similarity in stone tool production between the Transitional Complex and the Moresby tradition, suggesting that the former developed directly from the latter. This is the only case of a clear similarity and probable continuity between the initial and later coastal cultures on the north coast. Some undiagnostic artifact types seen earlier in the Moresby tradition, such as unifacially retouched basalt flakes, pièces esquillées, and abraders, were also recovered at Blue Jackets Creek (Severs, 1974a), which might indicate continuity between the two traditions (Fladmark *et al.*, 1990:235).

At present, the relationship between the Transitional complex and the Graham tradition is not well understood. Fladmark (1989:217) discounts the possibility that Blue Jackets Creek and Skoglund's Landing II represent functionally different localities because the sites are only 5 km apart, and there is considerable overlap between the two areas. At one time Fladmark (1979) argued that the Transitional Complex represented the indigenous culture and population of the Queen Charlotte Islands—a direct link to the Moresby Tradition—whereas the Graham Tradition represented transplanted mainlanders. In a modified version of this position, Fladmark (1989:217) suggested that the people of the Graham Tradition were a segment of society that proved more receptive to influences from the mainland beginning about 4500–4000 BP, whereas the people of the Transitional Complex were more conservative and resistant to change.

Central Coast of British Columbia

The period of 4500–3500 BP on the central coast of British Columbia is represented at Namu by the Period 3 and 4 components. Cultural changes

seen at Namu during this time parallel changes seen elsewhere on the north coast. Microblades and flaked bifacial projectile points are not found after about 4500 BP (Luebbers, 1978:66), whereas bone tools and ground stone implements appear for the first time. New additions to the artifact assemblage include ground and polished celts (adze blades), burnishing stones, ulna awls, fixed barbed points, and bone wedges. The celts and wedges point to an elaboration of the woodworking industry.

A series of multiple burials is associated with Period 3 deposits at Namu (Luebbers, 1978). R. Carlson (1991a:91) reported three new early radiocarbon dates for these burials: 4775 ± 130 (S2326), 4700 ± 125 (S2328), and 4680 ± 160 (SFU 342) BP. One multi-individual interment includes remains of a male approximately 50 years old, and two females of about 15 and 30 years old. The burial of the 15 year old included approximately 4000 shell disk beads and red ocher, along with bone and stone hunting tools (Luebbers, 1978:32). Another burial series contained the remains of 12 individuals, buried over three separate periods according to stratigraphic evidence. R. Carlson suggests that this area of the site, in the main trench excavation, may have been designated for burials.

Shellfish remains became an important component of the midden matrix by 4500 BP at Namu. Rock-dwellers predominate, led by mussels, followed by whelks and barnacles (Cannon, 1991:36). There was a sharp increase in salmon remains during Period 3 compared to Period 2, possibly reflecting sea-level stabilization after 5000 BP. In terms of identified faunal remains, salmon made up 92% in Period 3 and 94% in Period 4. Rockfish declined from 5% in Period 2 to between 1 and 1.5% in Periods 3 and 4. Among the nonsalmon fish, herring reached a peak of 0.6% in abundance in Period 4. The most abundant mammalian remains belong to harbor seal and coast deer (Cannon, 1991:12). Various other species of land and sea mammals are minimally represented. The extreme abundance of salmon is in accord with Namu being occupied during the salmon runs, with other food resources being incidental.

Summary of the North Coast

Coastal occupations continued along the North Coast during the period from 4500 to 3500 BP, but differ in important ways from the preceding North Coast Microblade Tradition. The most obvious changes are seen in the tool assemblages, and, with one exception, little overlap is found. Microblades are no longer found, whereas by the end of this period bone tools and ground stone implements appear in large numbers.

A number of distinct regional archaeological cultures are seen along the north coast during this period, in clear contrast to the preceding period. In general, within the north coast area there seems to be as much cultural

variability at this time as found in the central and south coasts. Not only do we have the Period III culture seen at Prince Rupert Harbour, but also the Gitaus and Skeena phases at Kitselas Canyon, two archaeological cultures on the Queen Charlotte Islands and two more coeval cultures found at Hidden Falls and Namu.

Although the subsistence information is not as good as it might be, the patterns revealed indicate a broadscale adaptation. On a general level, Christenson (1980) suggests that in areas with low initial density, human groups often respond to population growth by first making greater use of every available resource before intensifying the production of any particular resource. A broadscale adaptation to locally available resources is indicated for most north coast sites between 4500 and 3500 BP. Coastal resources were surely the staff of life at this time.

Fladmark *et al.* (1990:237) suggest that a settlement pattern typical of "collectors" (Binford, 1980) evolved on the north coast during the Graham tradition, with seasonal movements to areas of predictable resource abundance. The evidence they cite for seasonal specific occupation is from the Tow Hill site, which, because it was first occupied about 3000 years ago (Fladmark *et al.*, 1990:235), belongs in the next stage, discussed in Chapter 6. Evidence of possible seasonal transhumance, however, does exist from the Prince Rupert–middle Skeena River area during the Gitaus phase. At this time coastal groups may well have regularly moved inland up the Skeena River as far as Kitselas Canyon to fish for salmon. Namu also appears to be best interpreted as a salmon fishing site, although Rosie's Rockshelter—which is clearly not a base camp—shows a wide range of exploited resources.

The Skeena phase is more difficult to interpret in terms of the seasonal transhumance model. Allaire (1979) and Ives (1987) have argued that the Skeena phase, with its well-developed chipped stone industry, represents an incursion of interior-based people, possibly speakers of an Athapaskan language. Coupland (1988a, 1989b) notes that although similarities between the Skeena phase and interior tool assemblages are only general at best, diagnostic Skeena phase tool forms, like lanceolate points, are present, albeit rare, at Prince Rupert Harbour. He argues for a continuation of a coast–inland seasonal mobility during the Skeena phase with increasing emphasis on land mammal hunting. More work is needed to resolve this problem, which centers on how to interpret interassemblage variability, especially between coastal and inland sites.

In spite of all these developments, and many of them are unique to the Northwest Coast, there is little evidence of the ascribed rank, large winter villages, and household economic organization seen in the ethnographic pattern. In this regard as well, the northern Northwest Coast is seen to be at a similar level of development as the central coast.

CHAPTER SUMMARY

Bone, antler, and ground stone tools, coastally oriented subsistence with regular use of shellfish—all features of the ethnographic cultural pattern—first appear on the Northwest Coast between 4500 and 3500 BP, and slightly later on the south coast. Subsistence economies throughout the Northwest Coast area show a clear adaptation to coastal resources. Land mammals, especially deer, were still hunted, but had become a less important part of the diet compared to the preceding period. It may be that deer and elk were now as important for their hides and bones as for their meat. The decline in importance of land mammal hunting is most evident in the central coast. We do not believe that this decline means a lesser number of deer were being procured, but instead that there was a large increase in coastal populations, allowed for by more effective exploitation of fish, shellfish, and sea mammals.

In the broadest terms, what we appear to see is the "settling in" of local groups to local resources. This process appeared to be occurring throughout North America during this period—the development of "Archaic" adaptations. In any event, the setting-in process appears to have produced considerable variety among local cultural complexes. Regional subsistence economies varied according to the availability of local resources. We have already seen the extensive use of shellfish and sea mammals along both the north coast (Graham tradition) and the Oregon coast where salmon abundance is low. Elsewhere, it appears that salmon increased in importance, a pattern that is most apparent in the St. Mungo culture and at Namu.

There is great regional technological variability during this stage. On the north coast, ground stone tools are very abundant at Hidden Falls II but barely present at Prince Rupert Harbour. Similarly, ground stone tools appear to be absent in the Obsidian Culture along the northern Vancouver Island coast, yet present in some numbers during the contemporaneous St. Mungo Phase. At the same time, however, some items indicate widespread contact among these different cultures. Ribbed stones and crosshatched stones, for instance, are found in a number of different sites on the north coast.

The variability that developed in local cultures on the Northwest Coast between 4500 and 3500 BP may be related to the emergence of distinct ethnic patterns that continue into the ethnographic period. It has been suggested, for example, that the early Graham tradition culture on the Queen Charlotte Islands may be ancestral to ethnographic Haida culture (Fladmark *et al.*, 1990:237), that the St. Mungo culture evolved into Halkomelem-speaking Coast Salish (Ham *et al.*, 1986), and Period III at Prince Rupert is thought to mark the beginning of Tsimshian occupation in that area (MacDonald, 1969). Even within the St. Mungo Phase, one of these distinct archaeological cultures, there is evidence of possible ethnic differ-

ences as reported earlier. A number of distinctively different stylistic artifacts are distributed among three St. Mungo sites, very similar to the present geographic division between the Halkolmelem and North Straits Coast Salish languages. On the other hand, the relationship between the early Graham tradition, as seen at Blue Jackets Creek, and ethnographic Haida remains unclear. Although this association of regional cultural variability beginning about 4500 BP with historic ethnographic groups must be considered extremely tentative, there is no doubt that the regional cultures present at this time are a substantial change from the initial occupation of the coast and must include a variety of ethnic groups.

Although we begin to see many traits that become part of the later ethnographic cultures appear during this period, it is clear that the Developed Northwest Coast Pattern is not yet present. Large houses, let alone large winter villages, are not known during this stage, and the corresponding complex household organization must also be absent. Similarly, although there are some indications of social status differences, convincing evidence of ascribed differences is lacking, and large-scale storage evidence is completely absent. Scant evidence exists of the seasonal round of long-duration winter habitations and limited-activity sites that are focused on large-scale processing of seasonal resources. Although there are some indications of seasonal sites on the north coast, the better known central coast—and particularly the St. Mungo phase—indicates that sites were being occupied for a number of seasons and for considerable duration. This pattern is also repeated for the south coast manifestations and is in accord with the evidence on Rosie's Rockshelter on Heceta Island.

During the next stage we will see evidence for multifamily households, winter villages, large-scale storage of salmon, and even possible indications of ascribed social status. They do not, however, all appear in any single culture, indicating that although all the ingredients of the Developed Northwest Coast Pattern are present, this pattern may not yet have been achieved.

This page intentionally left blank

6

The Development of Cultural Complexity

* * *

INTRODUCTION

During the period from 3500 to 2500 BP, Northwest Coast archaeological cultures begin to show clear relationships to later ethnographic cultures. These resemblances raise the question of whether all the traits associated with the later Northwest Coast societies—ascribed status, winter villages, dependence on stored salmon, in short, the Developed Northwest Coast Pattern—had been achieved. We begin this chapter by reviewing some of the models that have been put forward to explain the emergence of the Developed Northwest Coast Pattern. Once we have reviewed these, we will be in a position to compare the evidence from the archaeological record with these explanatory models. We will begin our survey of this stage in the

Gulf of Georgia area, where the first culture of this stage, the Locarno Beach phase, was identified.

IDEAS FOR THE ORIGINS OF THE DEVELOPED NORTHWEST COAST PATTERN

Existing parallel to—and sometimes seemingly independent of—the history of archaeology outlined in Chapter 3 are ideas about the origin of the ethnographic pattern. Over the years a number of theories have been developed to explain the origins of the Northwest Coast ethnographic cultures. We briefly outline eleven ideas that have some currency.

From Boas on, various workers have offered their views on the origins of the Developed Northwest Coast Pattern, although it is only in the last twenty years that there has been much archaeological evidence to shed light on these issues. Kroeber's views on this problem were similar to earlier statements by Boas (1902) and H. Smith (1903), and are still influential, or, are at least in agreement with some current models, and are well worth quoting in this brief but complete presentation.

> Recent conditions at the southern end, as well as the slender archaeological evidence available, suggest that the Northwest Culture was originally a river or river-mouth culture, later a beach culture, and only finally and in part a sea going one. This means that the recent hinterland cultures of the Columbia–Fraser drainage (Plateau) and of the Intermountain Athabascans evidently provide approximate illustrations of an early stage of Northwest Coast culture. (Kroeber, 1939:28)

Kroeber's scheme, then, suggests that the salmon use adaptation first occurred in an interior, riverine setting, then moved to the river mouths, incorporating beach resources, and finally exploited limited pelagic ocean resources. Antecedent analogs were sought in interior groups, where one finds winter pithouse villagers dependent on salmon, but a mobile, broad-scale gathering-and-hunting pattern the rest of the year. One would expect the proto-coastal interior societies to be relatively egalitarian and mobile prior to the later coastal developments. We will see that Burley's (1979a, 1983) model, among others outlined below, follows this perspective very closely.

One aspect that is not included in Kroeber's scheme is how, when, and where large-scale salmon storage occurs. We can, however, infer this from his suggested ethnographic interior analog. Ethnographic interior groups process salmon for winter use during the late summer and fall (Teit, 1900). So it fits with Kroeber's model that large-scale salmon processing and storage adaptation occurred inland well before it was found on the coast, and before the unique characteristics of the Developed Northwest Coast Pattern developed. An implicit question in this model is why the interior groups

did not become part of the Northwest Coast culture area. In other words, if salmon is so important, what additional features are there along the coast that allowed a complex society to develop there and not in the interior? One of the models discussed below offers an explanation for this anomaly.

Contrasting with Kroeber's *in situ* development view, migration from elsewhere has also long been held to be important. The Locarno Beach culture has been thought to be the result of a migration of Eskaleut people (Borden, 1951; Drucker, 1958; Osborne *et al.*, 1956). In some ways, of course, migration is a nonexplanation, because if the Developed Northwest Coast Pattern evolved elsewhere and arrived on the Northwest Coast complete, the question of how and why this cultural pattern developed is still unanswered. Borden, although he viewed the Locarno Beach culture as being definitely Eskimo related, queried "whether it developed locally under the influence of early northern maritime cultures or whether it arrived here nearly developed" (Borden, 1951:48).

R. Carlson, in his report on the Helen Point site, also raised the possibility whether the Mayne phase was part of an early "bilateral harpoon" horizon the ultimate origin of which lay somewhere to the north (R. Carlson, 1970). This model is consistent with Borden's migration and "stimulus diffusion" hypotheses but with the event occurring slightly earlier than the Locarno Beach phase, and not necessarily of Eskaleut origin. In the several variants of the migration and stimulus-diffusion ideas, the migrants must have developed the attributes that distinguish the Developed Northwest Coast Pattern. If the migrants did not have all of the essential characteristics, then although the migration may be part of the story, something must have occurred after the migration to create the Developed Northwest Coast Pattern. Mitchell (1969) was an early critic of migration theories to explain Northwest Coast culture change.

Borden also saw migration or diffusion from the interior to the coastal areas as being important in the evolution of the Developed Northwest Coast Pattern. According to Borden (1951, 1954) this interior influence occurred after the Locarno Beach phase. Borden, then, may be said to have raised the possibility that the Developed Northwest Coast Pattern was the result of an early coastal migration of the "Eskaleut" Locarno Beach, and a later, interior-to-coast movement.

Fladmark (1975) presents another, very different perspective on the origins of the Northwest culture, focusing on the area north of the Columbia River. He argues that large-scale Northwest Coast salmon use developed shortly after salmon became abundant. Fladmark believes that salmon did not occur in large numbers until the sea–land relationship stabilized many thousands of years following the last glacial advance and that large shell middens only developed after this stabilization occurred. According to this model, large salmon runs and sea–land stabilization are seen as developing together about 5000 years ago (Fladmark, 1975:207). The Developed

Northwest Coast Pattern then evolved relatively shortly thereafter, or in Fladmark's words:

> This indicates that the advent of shell-midden build-up at 5,000 B.P. can be seen ... as ... *the result of a shift to the winter village settlement pattern following the development of peak salmon productivity.* [italics in the original]. (Fladmark, 1975:253)

Extensive salmon use, in this view, occurred very shortly after they became available, and developed *in situ* and not necessarily along rivers in the interior. The development of the Northwest Coast economy is seen as a response to salmon abundance and did not involve a change in adaptation (Fladmark, 1975: 294–297). The intensive use of shellfish is thought to have occurred with the development of salmon-based winter villages. This model, then, sees the Developed Northwest Coast Pattern occurring as a result of changing environmental conditions.

As originally presented, large shell middens were seen as indicating winter village components. From Chapter 5, this can no longer be maintained. Fladmark (pers. comm.) now believes he was mistaken in this attribute, but believes other aspects of the model are valid.

Even this updated model leaves some important questions unanswered, however. One wonders why the Northwest Coast pattern did not develop earlier south of British Columbia, in areas that were not glaciated during the Pleistocene, and where rivers remained stable, at least relatively, and where the lack of isostatic rebound meant the sea levels went through slower and less drastic changes. Note, also, that as stated in our brief review of north coast sea-level changes in Chapter 4, current evidence indicates that it had settled to within 15 m of the current position by 9000 BP. In contrast, Fladmark (1975:151–152), for example, has the sea level at Prince Rupert Harbour as much 40–50 m above the modern level at 7500 BP, whereas Clague (1983:337) shows that it was within 2 or 3 m of modern sea level by 8500 BP.

Although neither Kroeber nor Fladmark address salmon storage explicitly, Schalk, in a wide-ranging review on the use of Pacific salmon (Schalk, 1977) brought it to archaeologists' attention. Schalk notes that in northern and inland riverine situations, large numbers of salmon may be available in an area, but only for a short time. Unless one has the technology to obtain large numbers in a short period, and process them for storage before they spoil, this short-term abundance means little. In Schalk's perspective, the development of effective salmon storage processing techniques is the critical event that permits the large-scale use of salmon. Slightly earlier Matson had briefly presented a similar idea (Matson, 1976:306).

Burley (1979a, 1980) has proposed a model that can be viewed as a combination of Schalk's emphasis on storage and Borden's (and Kroeber's) interior-coast movement, but also including "adaptational" aspects. The ideas discussed previously do not concentrate on the processes by which

changes occur in how people make their livelihood (Wood and Matson, 1973; Kirch, 1984). Burley's model in some ways acts as a bridge between the previous models, which do not stress the context in which adaptational changes occur, and those more abstract, evolutionary ones that follow.

Burley argues that the core salmon procuring and processing for storage technology most likely developed not at the coast, but slightly inland where the rivers first narrowed. Once the salmon processing and storage technology had developed in locations such as the lower end of the Fraser River canyon, near the previously discussed Milliken site, either the technology diffused or the people migrated downstream to the coast. In the new coastal environment this adaptation stimulated the development of other key aspects of Developed Northwest Coast Pattern, such as ascribed status, primarily through a need for greater complexity in labor organization in the new setting (Burley, 1983:168). This need would create selection pressures for a centralized head to regulate labor, resource procurement, and redistribution, resulting in increased social stratification through a positive feedback loop (Burley, 1983:168–70). Although he presents this argument for the development of the Developed Northwest Coast Pattern in the Gulf of Georgia region, the basic evolutionary idea can be easily reformulated for the evolution of the Developed Northwest Coast Pattern in general. Specifically, Burley presents this model to explain the Marpole phase, which is discussed in Chapter 7. He and Beattie argue there is evidence for a population replacement event at this time (Burley and Beattie, 1987).

K. Ames has presented a model to explain the developments in the Skeena River region of the north coast that can be viewed as an elaboration of the second part of Burley's model (Ames, 1979, 1981, 1983, 1985). He emphasizes the efficiency of a hierarchical model for information processing. Thus a stratified system is argued to be more efficient than an egalitarian one, in terms of making use of information, given the complicated resource extraction system of Northwest Coast fishing technologies. Furthermore, potlatches signaled the relative success of the various groups, thus encouraging movement of people to resource-rich places, increasing the resiliency of the system (Ames, 1981). Ames thus focuses on the structure of the social system rather than on characteristics of the subsistence pattern. Coupland has developed a model that combines an emphasis on procurement with a focus on the social system.

Coupland's egalitarian corporate groups model for the same area (Coupland, 1985b, 1988a, 1988b) has communities first evolve to control and defend resources as a corporate group. In the Northwest Coast area the obvious important resource is salmon, once large-scale storage had been developed. Permanent occupation aids resource defense and control, encouraging the establishment of permanent villages (Coupland, 1988a: 31). Next, supranuclear family groups began to control individual resource locations, and live together in egalitarian households. Through a process

of positive feedback (Wood and Matson, 1973), possibly centered on the need for, or increased efficiency of, larger resource-processing groups, the small, egalitarian but multifamily households of the early village grew in size and became internally ranked. High-status individuals may have developed coercive ways of consolidating their power. These characteristics developed only after permanent settlements and multifamily households had evolved. Rank society, according to Coupland (1988a:36–39), formed only after corporate control of resources, multifamily households, and semipermanent winter villages had developed. Coupland's egalitarian corporate groups model is more complicated than this brief review, but many of the other parts follow a perspective outlined earlier by Matson (1983, 1985) and reviewed below.

Coupland also has presented a modified version that emphasizes later developments of the evolution of ascribed statuses including how power is maintained (Coupland, 1988b). In this view, which has a decided Marxist cast, elites by their control of ritual, achieved supernatural sanction for their control of the material resources and exploitation of nonelites. This view of Northwest Coast society was put forward by Ruyle (1973) and is in agreement with positions taken by Donald (1985) and more generally by Wolf (1982).

Coupland (following Testart, 1982) emphasizes the fact that storage creates a potential for the separation of stored goods from the producer. He states, "The implication of Testart's argument is that large-scale storage is a necessary condition for the emergence of social inequality" (Coupland, 1988b:215). Here storage is again emphasized, but in a manner quite different from Schalk. In a situation where segments of society are not free to migrate elsewhere (Matson, 1983:138–141), one is more likely to be exploited (Gilman, 1981:7) because one cannot escape by simply moving away. Most importantly, Coupland relies on Legros' (1981, 1982, 1985) ethnographic accounts of the Tutchone to support the notion that coercion was an important method used by elites to control resources and exploit labor.

According to Legros, the Tutchone, inland Athapaskan neighbors of the Tlingit, used cross-cousin marriage to form powerful, socially elite, corporate families. These families controlled critical resource locations and were even willing to use violence against members of their own communities to maintain control. Tutchone social stratification is documented for only a 20-year period during the nineteenth century (Legros, 1985). In their impoverished environment, with a low population density, it is doubtful that stratification could have been maintained permanently.

In a society with a well-developed and powerful religious system, such as on the Northwest Coast, the threat of violence may be less necessary, and better concealed behind religious sanctions than in the more harsh environment and less developed system found among the Tutchone. That as-

pects of coercion lie behind Northwest Coast social complexity we do not doubt, even if this model for the development is not accepted. Almost all who have seriously looked at this see aspects of coercion and exploitation, including Ruyle (1973), Suttles (1973), Mitchell and Donald (1985), Donald (1985), and Mitchell (1984).

Croes and Hackenberger (1988; Croes, 1992b) have developed an economic explanation of the Developed Northwest Coast Pattern, based on modeling of the environs of the Hoko River site, in the Straits of Juan de Fuca. They have developed Schalk's (1977) idea of storage into an evolutionary model. They first divide economies into those without large-scale storage, "prestorage," and those with large-scale storage, "storage." They present evidence that in their area, for the prestorage economy, the resource-poor season was winter, and the limiting resource during this season was shellfish. Thus, the abundance of shellfish during the winter controlled the population size. As the population expanded towards carrying capacity, other resource extraction and preservation techniques were developed to augment shellfish, one of which became large-scale fish storage. Croes and Hackenberger demonstrated that in their area, the amount of preserved flatfish obtained in the spring and summer would have been greater than the amount of salmon available (prior to the development of deep sea [pelagic] trolling techniques for salmon, which occurred much later.) They further argued that this proposed initial emphasis on flatfish may have existed on an area-wide basis, and that only later would the emphasis on stored salmon develop, in part because flatfish are available much longer than salmon, allowing less efficient processing techniques to be effective. In their view, the use of salmon probably peaked during Marpole times (2400–1400 BP), when the population carrying capacity increased (according to their economic model) by a factor of six over that of the prestorage model.

Croes and Hackenberger's model assumes changes in subsistence activities occurred after carrying capacity was approached, with storage being the crucial newly introduced technique. The relationship between this economic development and the occurrence of the other aspects of the Developed Northwest Coast Pattern is similar to Matson's model of resource control and localization (Croes and Hackenberger, 1988:77), which is reviewed below. Croes and Hackenberger's economic model fits nicely with the archaeological evidence from the Hoko site, and we look forward to seeing how well it corresponds with information from other sites. It is the first model that has taken abstract ideas—in this case Schalk's view of storage is essential—and developed a complete application to a specific area that results in concrete, testable expectations. Furthermore, it is the first model to quantify the effects of moving to a storage economy incorporating large-scale use of salmon.

Matson has earlier (1983, 1985) argued that the control of natural resources of different economic worth resulted in human inequity. Such resources would merit controlling and protecting only if they were dense, predictable, and reliable, a logic very similar to that developed independently by Dyson-Hudson and Smith (1978) for human territoriality. Once units smaller than the whole community controlled resource locations, either differences in the values of each resource patch, or changes in benefits resulting from technological developments would result in *de facto* inequalities between the groups. Matson further argued that once one resource that necessitated a relatively sedentary seasonal pattern was controlled, other less important resources would also be incorporated into such a system. This argument follows from the observation that the control of a resource necessitates a relatively sedentary seasonal pattern; if one is not near the resource at critical times, someone else could exploit it.

The inheritance of reliable resource patches would result in the Developed Northwest Coast Pattern, through a positive feedback loop (Wood and Matson, 1973), as each group sought to control each unowned, less important resource location, for if they did not, another group might "control" it and deny access to all others. The "costs" involved in controlling these additional resources would be small, because the primary cost, those involved in sedentariness, would have been spent in controlling the major resource. In the Northwest Coast this trajectory would result in salmon being most important initially, as some of the additional resources would eventually become important (Matson, 1983). Salmon has the very important characteristic that extraction can be intensified with very little effect on its abundance, in contrast with most other resources, which usually can be easily overexploited (Matson, 1983).

Matson (1983) argued that the situation in the interior was different; with numerous fishing locations along rivers, the ownership of the best allowed others the use of inferior, "unowned" salmon fishing locations, where a large number of salmon could still be obtained (Teit, 1900). Furthermore, given the low population density in the interior, most other resources were not controlled, resulting in free access to the necessities of life. In the interior, then, the feedback loop was limited, and social complexity was limited in scope and duration.

Matson (1989) suggested a likely trajectory for the development of a coastal system would be initiated in the prestorage economy of Croes and Hackenberger where shellfish were the crucial wintering resource. Shellfish beds are reliable, predictable, and localized, not to mention essential in this kind of economy. Shellfish beds might be the first resources controlled by groups and villages. Once this "ownership" pattern was established it could be expanded to include fishing locations when fish storage became significant.

In addition to these models, which attempt to explain the evolution of the Developed Northwest Coast Pattern, Rosman and Rubel (1986) and Rubel and Rosman (1983) have attempted to explain the origins of the differences between the "northern" Northwest Coast (Tlingit, Haida, Tsimshian) and the central portions (Wakashan and Coast Salish). In Chapter 2 we reviewed some of the differences between these two areas and the arguments that these derived from dissimilar resource distributions (Suttles, 1962; Schalk, 1977; Riches, 1979). Rosman and Rubel presented an alternate explanation, in which the dissimilarities derive from different social structures in the antecedent societies.

In particular, Rubel and Rosman (1983) saw the northern matrilineal systems as logical developments from neighboring interior Athapaskan systems. Dyen and Aberle (1974) argued on the basis of linguistic reconstructions that the proto-Athapaskan system was matrilocal and matrilineal. Rubel and Rosman also suggested that moieties, feasting, and "big men" are part of the basic Athapaskan system. In the richer coastal environment the big men are transformed into Northwest Coast "chiefs," the feasting into potlatches, and the moieties into phratries. Linguistically, according to Greenberg (1987), the Tlingit are Athapaskan or a member of the Na-Dene "phylum" (Thompson and Kinkade, 1990), and the Haida are probably distantly related (Na-Dene according to Greenberg, 1987, and Sapir, 1915). One wonders, though, whether the potlatches, big men, and moieties found in the interior are really antecedent forms, or whether they are the result of extensive contact and trade with the more complex Northwest Coast systems. Many of the interior Athapaskan groups have been in their current locations only for relatively short periods of time, and are notably more Northwest Coast-like the closer their residence is to the coast. As examples of the latter, compare the Ulkatcho Carrier and the Babine Lake Carrier with more interior Athapaskans in *The Handbook of North American Indians, Volume 6, Subarctic* (1981) and discussions in Dyen and Aberle (1974:275, 284, 289, 347, 356, 366, 371–372) concerning the influence of the Northwest Coast groups on interior Athapaskans.

Rosman and Rubel (1986) argued that the differences between the central and north coasts are the result of evolution from different social structures. For the south coast the antecedent system is similar to ethnographic interior Salish (Teit, 1900), with a cognatic, bilateral descent, resulting in the ambilineal systems seen among the Kwakiutl and the bilateral systems among the Coast Salish. Because Salish are present both along the coast and in the interior, such a model has a certain plausibility for the coastal Salish, but less so, for the linguistically unrelated Wakashan speakers. In both the north and central coast case, Rubel and Rosman appeared to be following the basic model posed by Kroeber (1939), although their use was quite different from the models previously discussed, as they added a

structuralist perspective. Although today the social distinctions discussed by Rubel and Rosman are beyond the the ability of present-day Northwest Coast archaeology to discern, these more detailed models attempting to explain the variation present along the Northwest Coast will undoubtedly become more important in the future.

From this review of development we can see that there are a number of different themes. We might call them (1) the migration–diffusion theme, emphasizing the geographic origin of cultures; (2) the ecological theme, emphasizing the material basis of life; (3) the systems approach, oriented around the economic organization; and (4) the structural approach, emphasizing the relationship and organization of different social units within a society. One might note that these themes are roughly in chronological order and parallel the concern with these topics in twentieth century anthropology. This is a facile explanation, however, as Wissler surely emphasized the ecological, as did Kroeber, and the Rosman and Rubel articles have a quaint 1960s aspect in that they appear to be similar to the attempts by Longacre (1964) and Hill (1966) to find material correlates of ideational aspects of culture.

As pointed out in our initial chapters, the Developed Northwest Coast Pattern is primarily a cultural ecological phenomenon, being highly correlated with coastal and salmon resources, and cross-cut by deep linguistic divisions. We believe that the origins are also to be sought in contexts where the cultural ecological aspects play a major role; however, simplistic statements, such as salmon abundance allowed the Developed Northwest Coast Pattern to come into being, do not constitute full explanations. The development of rank or class societies involves more than simple environmental determinism and must include the interaction of resources, resource technology, and social structure, and likely involved coercion and violence.

In the Gulf of Georgia region, it is in the Locarno Beach phase times ca. 3500 or 3300–2400 BP that we begin to see changes in economy, evidence of coercion, status markers, and settlement patterns that can be easily related to the Developed Northwest Coast Pattern. This same evidence can also be compared with the expectations generated by the models reviewed above, leading to a better understanding of how the Developed Northwest Coast Pattern came into being.

THE LOCARNO BEACH PHASE

The Locarno Beach phase was first recognized by C. E. Borden (1950, 1951) through excavations at the Whalen Farm site in Point Roberts and at the type site, Locarno Beach, in Vancouver (Figure 6-1). He recognized that these components were the manifestations of a new archaeological culture, earlier than any yet recognized in the Northwest Coast area, al-

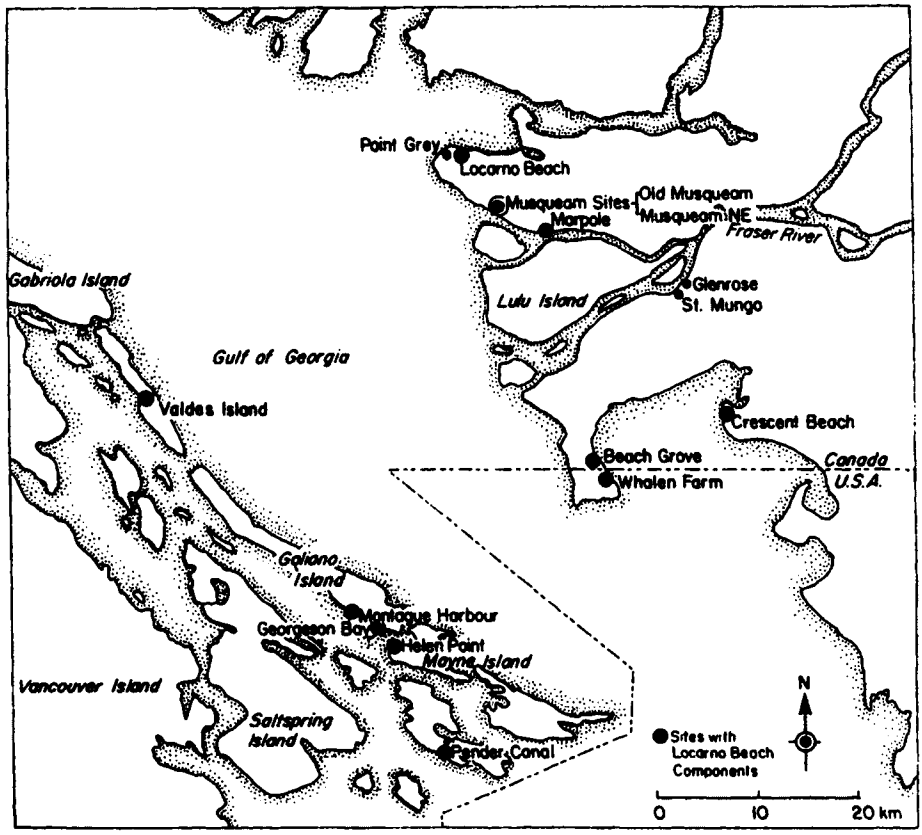


FIGURE 6-1 Sites with Locarno Beach components, Gulf of Georgia area.

though this culture was not dated until later. Borden's first reports on the Locarno Beach culture emphasized the presence of composite valve toggling harpoon heads and other artifact types, which contrasted with the later cultures. His early work stressed the "Eskimoid" nature of the Locarno Beach material (Borden, 1950, 1951; Drucker, 1955, 1958).

Borden also argued for large-scale sea mammal hunting, stressing the presence of composite toggling harpoon valves and interpreting some decorated objects as representing whale flukes (Borden, 1970). At this early time, however, systematic faunal analysis was not carried out, so convincing supporting evidence was not forthcoming. Borden later excavated a third site with a Locarno component, Musqueam NE (DhRt 4), on the Musqueam Indian Reserve in Vancouver (Borden and Archer, 1974), which also produced important waterlogged basketry material (Borden, 1976). Although Borden did not report any of these components in detail, (but see Matson, 1974, for a tabulation of DhRt 4 artifacts) he did prepare a

relatively thorough trait list for the culture as a whole (Borden, 1970). The Borden definition of Locarno Beach was used by other workers and extended to other sites in the southern Gulf of Georgia region, within the Coast Salish ethnographic area.

It was left to one of Borden's students, D. H. Mitchell, to set the standard for Northwest Coast descriptive reports with his dissertation (Mitchell, 1968b) on the Montague Harbour site on Galiano Island, which was revised and published in 1972 (Mitchell, 1971b). This work is both an evaluation of the Gulf of Georgia archaeology to that time, and the first modern complete British Columbian coastal site report. Much of what is known about the Locarno Beach culture is based on this synthesis and the associated excellent description of the Montague Harbour Locarno Beach component. Unfortunately, this work was also done some years before systematic analyses of faunal remains were regularly carried out in British Columbia, so it also lacks this critical information. Since Mitchell's synthesis a number of additional sites have been identified as having Locarno Beach components, resulting in a total perhaps double that of the previous St. Mungo–Mayne period. Mitchell (1990:341) indicates that 29 components of this culture are known; we list 28 probable excavated components in Table 6-1.

The Locarno Beach phase begins between 3500 and 3300 BP and ends by 2400 BP. Several dozen radiocarbon dates recorded on the mainland sites support this duration. This culture is chronologically between the St. Mungo and Marpole phases on the mainland, with the St. Mungo ending at 3500–3300 BP and the Marpole beginning at 2400 BP. The tools include the famous composite toggling harpoon valves (Figure 6-2A: g, h), which led Borden to postulate connections with Eskimo cultures, unilaterally barbed bone points, large hexagonal cross-sectioned slate points, shaped and decorated abrasive stones, bird-bone needles, ground slate knives, (some of which are much thicker than in later periods) labrets, stone celts, stemmed chipped stone points, and the wonderfully exotic "Gulf Island Complex" (Duff, 1956). The Gulf Island Complex consists of finely made small ground stone objects with no clear function (Figure 6-2A: d; B: f, i). In addition, obsidian microblades and quartz crystal microliths are present in some components.

Although many of the artifact types listed above are unique to the Locarno Beach culture, many of them are also rare (Table 6-2). In fact there is little difference in the abundance of common artifacts present between Locarno Beach and certain later Marpole components (Matson, 1974; Mitchell, 1979; Pratt, 1992).

The available faunal analyses (Steifel, 1985) show that land mammals and sea mammals were taken as well as shellfish, salmon, and herring. The nature in which many of these faunal samples were collected, though, makes it difficult to be certain about differences with better known earlier and later phases. We can be relatively certain, though, that the large

TABLE 6-1 Excavated Probable Locarno Beach Components

Site	Reference	Faunal analysis[a]
Willows Beach	Kenny, 1974	–
Belcarra Park	Charlton, 1980	–
Jack Point (DgRx 5)	Murray, 1982	–
Puddleduck	Mitchell, 1988b	+
Montague Harbour I	Mitchell, 1971b	–
Little Beach, Ucluelet	Arcas, 1991a	–
Shoemaker Bay I (?)[b]	McMillan and St. Claire, 1982	+
Hoko River	Croes, 1989a	+
Pender Canal	R. Carlson, 1986	+/–
	Hanson, 1990	
Long Harbour (?)[b]	Johnstone, 1991	+/–
Bowker Creek	Mitchell, 1979	+/–
Georgeson Bay	Haggarty and Sendey, 1976	–
Helen Point	McMurdo, 1974	–
Valdes Island (DgRv 9)	Apland, 1981	–
Pitt River	Patenaude, 1985	–
Telep, Fraser River	W. Peacock, 1982	–
Buckley Bay (DjSf 13)	Mitchell, 1974	Wigen, 1980
Tsable River Bridge	Wigen, 1980	+
Marpole	Burley, 1979b	–
	Pratt, 1992	
Beach Grove North	Ball, 1979	–
Deep Bay (?)[b]	Monks, 1977	–
Millard Creek	Capes, 1977	–
Tsawwassen	Arcas, 1991b	–
Locarno Beach*[c]	Borden, 1950, 1951	
	Pratt, 1991	Steifel, 1985
Whalen Farm*[c]	Borden, 1950, 1951	
	Thom and Matson, 1991	Steifel, 1985
Musqueam NE (DhRt 4)*[c]	Borden, 1976	
	Borden and Archer, 1974	Steifel, 1985
Crescent Beach*[c]	Percy, 1974	
	Trace, 1981	
	Matson *et al.*, 1991	+
Simonarson (45-WH-48)	Gaston, 1975	–

[a] +, Indicates that a report is available; –, indicates that no report is available; a reference indicates when a report is available separately from the main site report.

[b] ?, Uncertain assignment.

[c] *, Site discussed in text in some detail.

amount of herring remains recovered, from some components at least (Steifel, 1985; Wigen, 1980), and present in a number of others (Mitchell, 1979; Matson, 1992) indicates that large-scale use of herring is a new addition to the subsistence pattern.

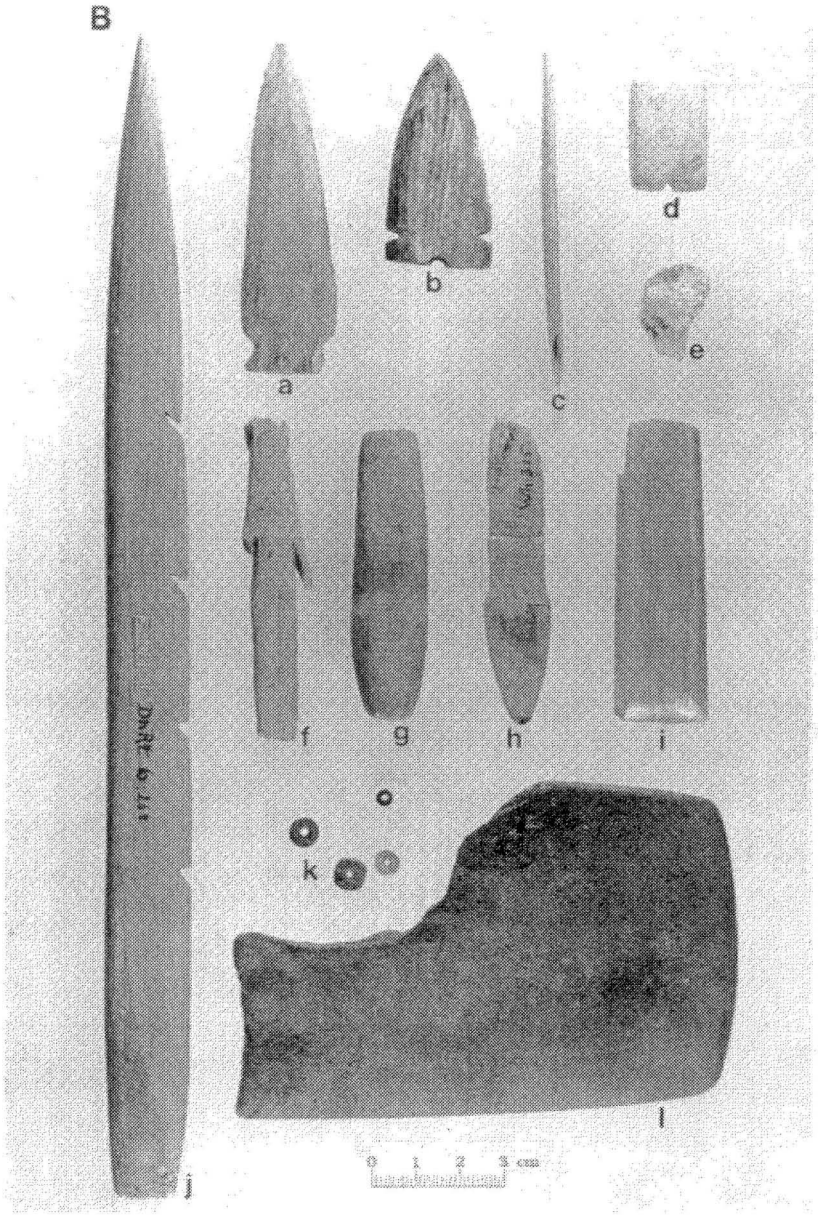


FIGURE 6-2 Locarno Beach phase artifacts. (A) (a, b) stemmed points; (c) ground slate point; (d) ground slate knife; (e) hexagonal ground slate point; (f, i) Gulf Complex items; (g, h) labrets; (j) small-pebble mortar; (k) ground stone adze blade. (B) (a) bone point; (b) mussel shell point; (c) bird bone awl; (d) Gulf Complex item; (e) quartz crystal core; (f) bilaterally barbed harpoon; (g, h) composite toggle harpoon valves; (i) bone "flesher"; (j) barbed bone point; (k) ground stone beads; (l) shaped abrasive stone. (From Borden, 1970.)

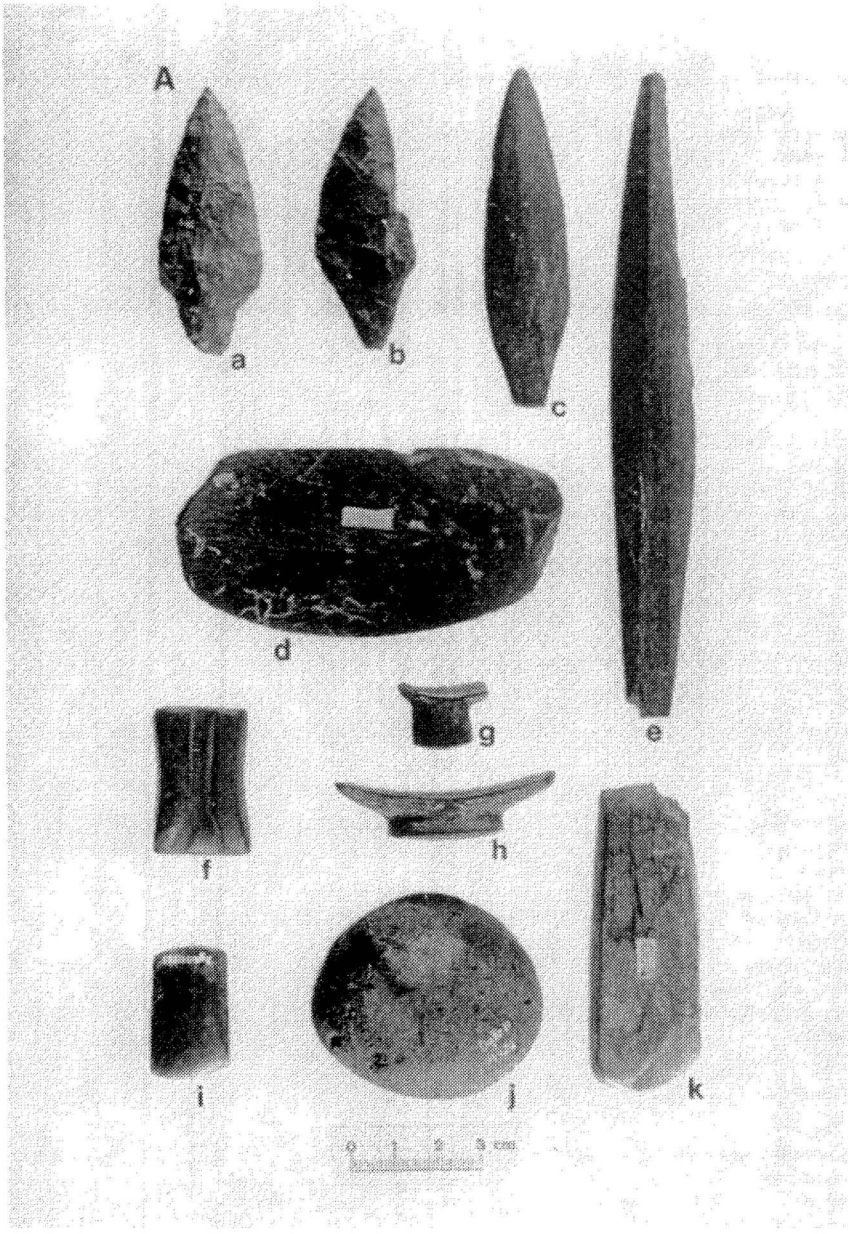


FIGURE 6-2 (*Continued*)

TABLE 6-2 Three Locarno Beach Components*

Artifact type	Montague Harbour I No.	%	Musqueam NE DhRt 4 No.	%	Crescent Beach No.	%
Chipped stone						
Retouched flakes	2	1.0	46	27.0	39	25.3
Slate disk	29	14.4	1	0.6	3	2.0
Pièce esquilée	0	—	0	—	5	3.2
Microblade/core	2	1.0	0	—	0	—
Chopper	17	8.4	2	1.2	17	11.0
Project points	9	4.5	2	1.2	14	9.1
Bifacial tools	6	3.0	2	1.2	7	4.5
Total	65	32.3	53	31.2	85	55.1
Ground stone						
Unfaceted point	1	0.5	3	1.8	0	—
Faceted point	1	0.5	2	1.2	0	—
Celt	2	1.0	0	—	2	1.3
Decorative objects	12	6.0	3	1.8	5	3.2
Labrets	1	0.5	1	0.6	1	0.6
Shaped abrasive	13	6.4	7	4.1	10	6.5
Unshaped abrasive	36	17.8	27	15.9	6	3.9
Handstones	5	2.5	0	—	0	—
Stone saws	2	1.0	0	—	2	1.3
Ground slate knife	1	0.5	15	8.8	0	—
Total	74	36.7	58	34.2	26	16.8
Pecked stone						
Hammerstone	7	3.5	13	7.6	9	5.8
Notched stone	8	4.0	8	4.7	1	0.6
Mortar/bowl	1	0.5	0	—	2	1.3
Total	16	8.0	21	12.3	12	7.7
Bone						
Barbed point	1	0.5	1	0.6	0	—
Unipoint	1	0.5	2	1.2	2	1.3
Bipoint	7	3.5	0	—	2	1.3
Mammal bone awl	9	4.5	3	1.8	9	5.8
Bird bone awl	1	0.5	4	2.4	2	1.3
Needle	0	—	3	1.8	0	—
Chisel/wedge	6	3.0	5	2.9	7	4.5
Ulna awl	3	1.5	2	1.2	0	—
Decorative object	3	1.5	4	2.4	0	—
Incisor tool	1	0.5	1	0.6	0	—
Tooth pendant	1	0.5	2	1.2	1	0.6
Total	33	16.5	27	16.1	23	14.8
Antler						
Composite toggle valve	2	1.0	2	1.2	0	—
Barbed point	0	—	1	0.6	1	0.6
Wedge	8	4.0	8	4.7	4	2.6
Decorative object	0	—	0	—	1	0.6
Total	10	5.0	11	6.5	6	3.8
Shell						
Shell tool	4	1	0	—	2	1.3
Total	4	2.0	0	—	2	1.3
Grand total	202		170		154	

*From Mitchell, 1971b; Matson, 1974; Pratt, 1992.

There is no definitive evidence of planked houses, villages, or of rank in described Locarno Beach components. The best house structure yet known, is a small "pithouse" (Figure 6-3) found at the Crescent Beach site (Matson *et al.*, 1991; Matson, 1992), although postmolds indicative of large structures are found in possible Locarno Beach components at Long Harbour (Johnstone, 1991) and Shoemaker Bay I (McMillan and St. Claire, 1982). Percy (1974) presented evidence that labrets were worn by adult males and argued that they were the mark of achieved rather than ascribed status. This follows from the logic that if they measured ascribed status, subadults would wear them, and from the observation that not all adult burials have evidence of labrets. Tentative results of burial analysis by R. Carlson (1987, 1991b) of the Pender Island material support a burial ritual that is in accord with achieved status, as well as with aspects of the historic treatment of the dead by Coast Salish. Burials are also found underneath piles of boulders, termed *cairn burials*. On the other hand, labrets were later worn along the north coast by people of ascribed status usually female (Cybulski, 1992), and R. Carlson compares the burial ritual of Pender Island with the Coast Salish, a society with definite ascribed status. The evidence for ascribed status, then, is equivocal, and is reviewed in more detail later in this chapter.

A final important point concerns the distribution of Locarno Beach sites. Mitchell (1971b:52,57–58) noted that Locarno Beach sites are located away from the mouth of the Fraser River, in contrast to the later Marpole sites, which appear to be centered around access to Fraser River salmon runs. Burley's (1980) and Matson *et al.*'s (1980) analyses support this distribution of Marpole sites, particularly the older Marpole sites, on the Fraser delta, and we know of no evidence to refute Mitchell's idea of a contrasting, more offshore, distribution of Locarno Beach sites. A pattern of Locarno Beach sites centered on the islands would be in accord with the notion that this culture developed out of the Mayne phase, away from the mainland, a possibility suggested in the last chapter.

Locarno Beach Phase Origins

Two recent studies have looked at the relationship between mainland St. Mungo and Locarno Beach phase components. Among other investigations, Pratt (1992) reanalyzed three St. Mungo components (Glenrose, St. Mungo, and Crescent Beach) and compared them with two mainland Locarno Beach components (Crescent Beach, Locarno Beach) although only one of the latter had been recently excavated. Her findings showed that most common artifacts occur in relatively similar abundance between the two cultures, indicating an evolutionary relationship. Another way to look at the relationship between Locarno Beach and St. Mungo is to compare a series of components using the relative number of artifacts in each

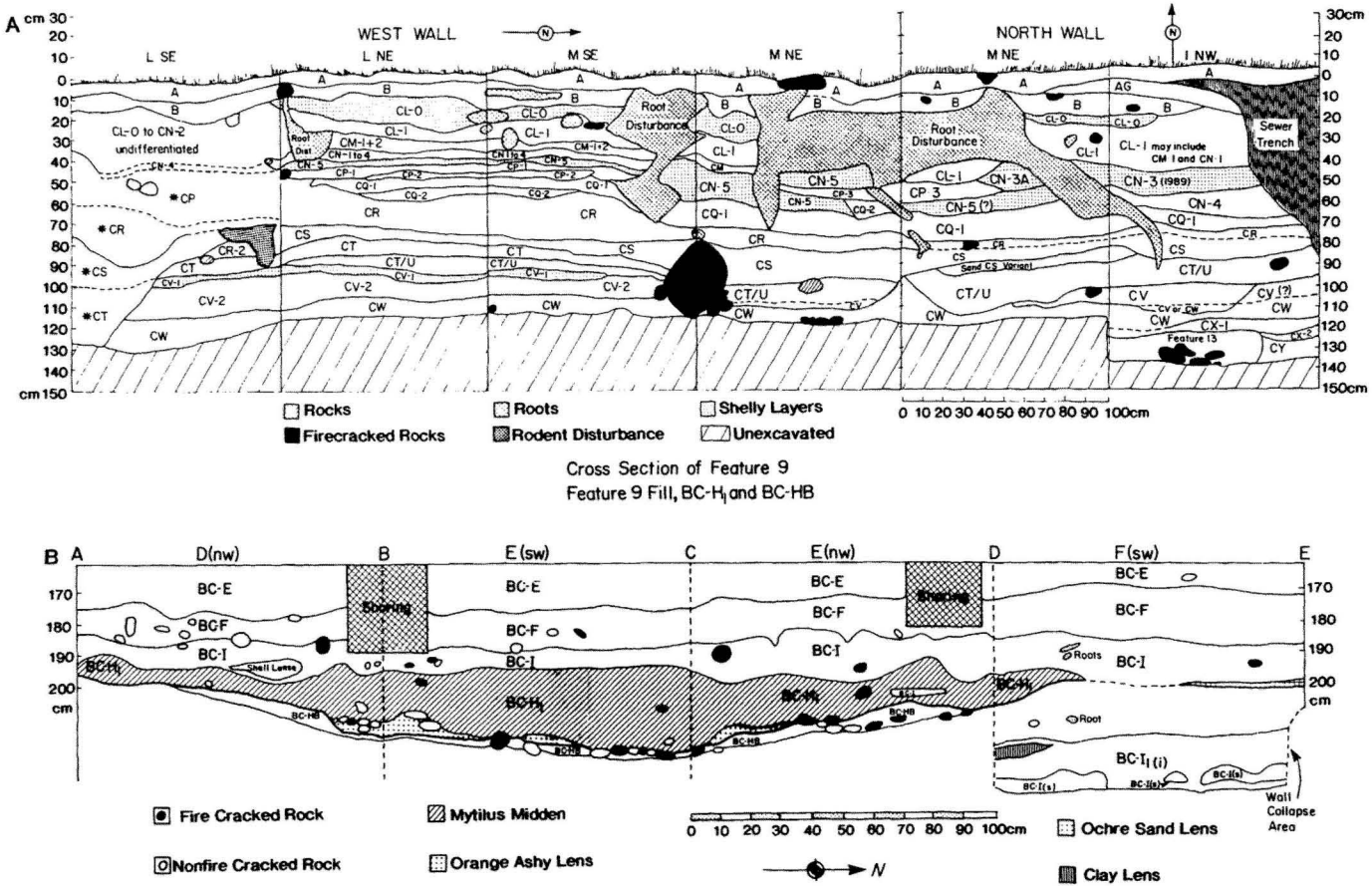


FIGURE 6-3 Crescent Beach Locarno Beach component. (A) Profile of South Trench. Locarno Beach component layers CQ to CT/U. (B) Structure in North Trench, Layers BC-H_1 and BC-Hb.

class to measure their similarity, (Figure 6-4) a procedure like that used by Jorgensen (1980) to compare western Indian tribes as detailed in the sidebar (Matson, 1989).

With a maximum of only three components from each period, these comparisons should not be weighed too heavily. The main result, however, is that many continuities do exist, supporting H. Pratt's (1992) conclusion. Both the cluster (Figure 6-4A) and the scaling (Figure 6-4B) analyses indicate that St. Mungo and Locarno Beach components belong to separate but sequential cultures. The main difference between the two is in the addition of ground stone tool types and increases in both bone and ground stone tool assemblages in the Locarno Beach phase. These analyses certainly support the idea of continuous *in situ* development on the mainland—without major dislocations—and indicate a far closer relationship between the St. Mungo and Locarno Beach cultures than anticipated.

In contrast, other similar analyses (Matson, 1989) show that significant differences exist between mainland and island Locarno Beach components, a dichotomy that is also seen in the next culture, the Marpole phase (Burley, 1980; Matson, 1989). Because the best described published Locarno Beach phase components are from the Gulf Islands (Mitchell, 1971b; Haggarty and Sendey, 1976), there may well be a misleading impression of the nature of the mainland Locarno Beach components (see Table 6-2).

For this analysis Matson followed Burley's (1980) list of 51 artifact types, developed to compare Marpole components (which Burley, in turn, had based on Matson's, 1974, analysis.) Matson added four classes (bone pendants, incised slate/schist, small bilateral harpoons, and ground slate knives) for a total of 55 attributes. He used city block distance and unstandardized percentages to create a distance matrix. Matson used St. Mungo components from Crescent Beach, Glenrose, and Component II of the work reported by A. Mackie (1982) from the St. Mungo site itself (Matson, 1989). For Locarno Beach components he used those from Crescent Beach, Musqueam Northeast (DhRt 4), and Montague Harbour. The furthest neighbor cluster analysis (Matson and True, 1974) (Figure 6-4A) clearly separates the two Locarno Beach components from Montague Harbour and Musqueam NE (DhRt 4) from the rest.

The most likely interpretation of the first dimension of the multidimensional scaling analysis (Figure 6-4B) is the island versus the mainland component. This interpretation is based on the large difference between Montague Harbour I and the rest of the sites, a difference that is repeated in other analyses (Matson, 1989) of Locarno Beach components. These differences are reflected in larger amounts of chipped stone on the mainland and more bone and ground stone tools on the islands.

A second interpretation is the expected contrast between the Locarno Beach and St. Mungo phases (see Table 5-2). St. Mungo components include more retouched flakes and pièces esquillées, whereas Locarno Beach has more slate and sandstone disks, as well as more decorative

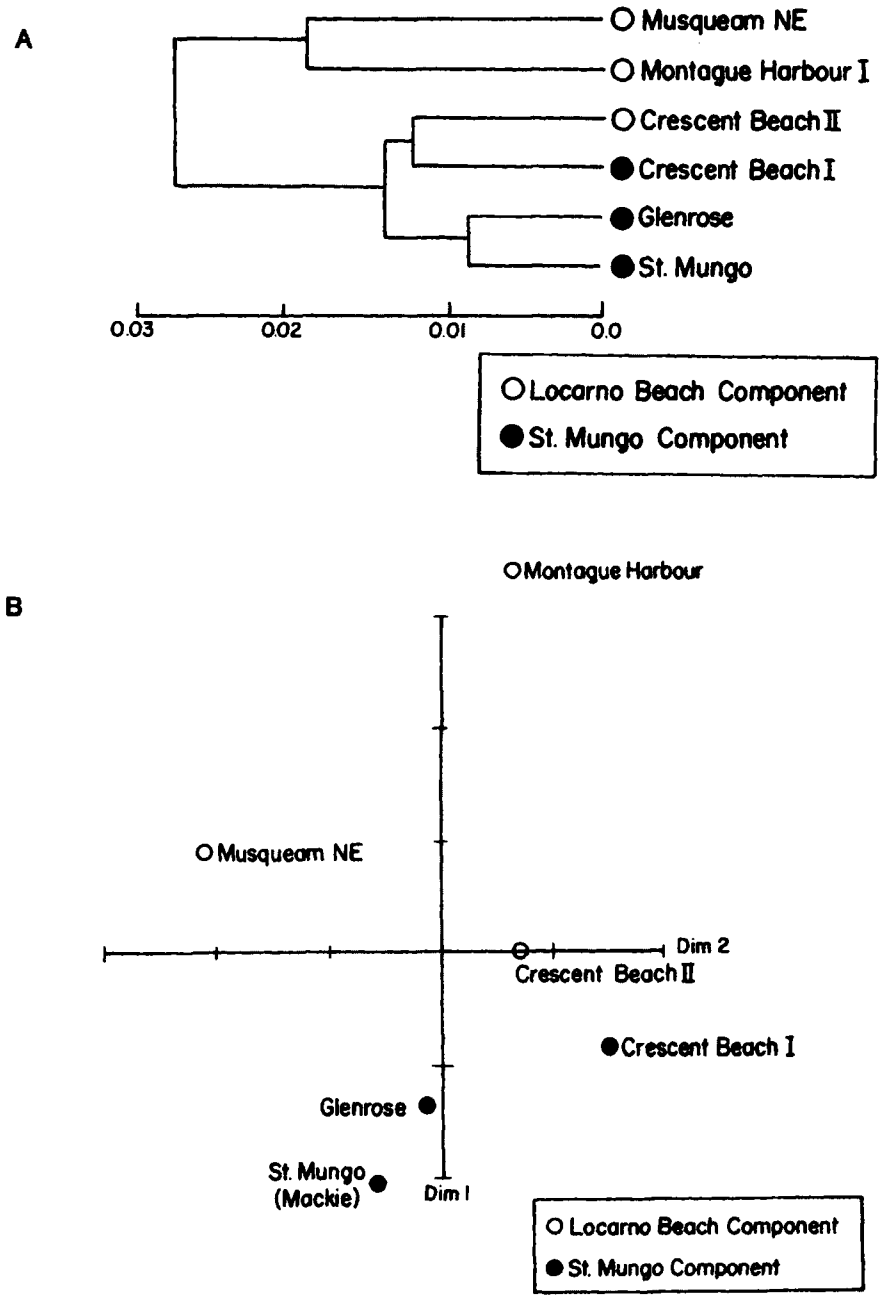


FIGURE 6-4 Relationship between Locarno Beach phase and St. Mungo cultures. (A) Cluster analysis; furthest neighbor and unstandardized city block distance. (B) Metric Multidimensional scaling.

ground stone material and abrasive stones of all sorts. Composite toggle harpoon valves and ground slate knives are also found only in Locarno Beach, whereas antler wedges, bone pendants, and engraved schist/slate are more common in St. Mungo. Surprisingly, a similar abundance of cobble tools and bone chisels or wedges are found in both cultures.

In contrast with this apparently continuous development from St. Mungo to Locarno Beach on the mainland, the large difference seen between Montague Harbour I and the mainland Locarno Beach components is consistently found between Mainland and Island Locarno Beach components. At this point it is difficult to know what this difference means. It may indicate that Locarno Beach developed first on the Gulf Islands, supporting the original definition of the Mayne phase by Carlson (1970), or this difference may result from divergent site settings.

Locarno Beach Subsistence

One of best sources of information presently available on Locarno Beach subsistence is by Steifel (1985), who looked at faunal material from the three Locarno Beach components excavated by Borden: Locarno Beach, Whalen Farm I, and the oldest component at Musqueam NE (DhRt 4) (Figure 6-1). Although there are questions about the representativeness of samples collected at the Locarno Beach and Whalen Farm sites 40 years ago, the general pattern for these two sites agrees with her findings from the more recently (1972–1973) excavated DhRt 4.

Steifel found that fish bones dominated her samples, with salmon ranging from 66 to 78% of the large fish at the two earlier excavated sites, and 59% at DhRt 4. At all three sites flatfish, mostly starry flounder, is the other common large fish, although at Locarno Beach it is only about half as abundant as in the other two sites.

Steifel, by screening some 35-year-old midden samples from Locarno Beach, was also able to discover that surf smelt and herring were the common small fish. Surf smelt were historically fished there by local native groups and are still caught off Locarno Beach today, in a sport fishery using small gill nets. These fish spawn most vigorously during the summer. Herring, only slightly less numerous in the samples from Locarno Beach, are not available in the area today, but were historically (Coupland, 1991). Ethnographically—and still today—large numbers of herring can be obtained in their spawning season in late winter with herring rakes—long poles with a single row of sharp 5-cm points set down the long axis of the pole.

The Locarno Beach type site includes two new important resources, which also indicate that its use was from early spring to summer. The inference of significant use of herring during the Locarno Beach phase is buttressed by the presence of herring at Bowker Creek (Mitchell, 1979), the

Puddleduck site (Mitchell, 1988b), Tsable River Bridge, and at Buckley Bay (Wigen, 1980).

Steifel also points out (1985:153–155) that no salmon head parts were found in any of the three Locarno Beach components, suggesting that the salmon were brought to the sites as preserved salmon backs. If so, this would be good evidence of large-scale salmon use, particularly at the Locarno Beach site itself, because it appears to have been occupied in the spring, when live salmon were not locally available (see sidebar).

Unfortunately, there are many questions about analyzing old collections. We also cannot be very confident about the absence of head bones, given the numbers of salmon bones identified at Locarno Beach (281) and Whalen Farm (446). DhRt 4, on the other hand, was excavated 20 years more recently, and yielded a larger number of salmon bones (2470) in Steifel's samples, putting the inference of stored salmon on firmer ground.

The pattern found by Steifel is reinforced by Wigen's (1980) report on two sites on the east coast of Vancouver Island on either side of the Tsable River (see Figure 5-7). The Tsable River Bridge site (DjSf 14) is located just south of the river, and the Buckley Bay site (DjSf 13), less than 1000 m north on the other side of the river. Buckley Bay, a single component site, is attributed to the Locarno Beach phase, as is the main component (II) at Tsable River (Wigen, 1980:10; Mitchell, 1988a:268). Both of these sites have modest numbers of salmon remains but lack salmon cranial bones (Wigen, 1980:107). Although Wigen interprets this as indicating salmon storage, the modest numbers, (471 and 346 identified salmon remains) and the 1973–74 field techniques not directed toward recovery of this material makes this a qualified interpretation, as Wigen acknowledges.

Wigen also reports large numbers of herring at these two sites (1076 at Buckley Bay, 9846 in component II at Tsable River), which indicate a late winter seasonality where salmon would enter the site as the result of storage, rather than as fresh fish. She argues that the sites were also occupied during the fall, when the salmon were spawning in the adjacent Tsable River. This is based on the idea that the salmon vertebrae found are from stored fish that were originally procured from these sites and processed nearby, but not actually on, these two sites.

> Boehm (1973) was the first to note that cranial elements could be used to infer that salmon remains represented stored rather than fresh fish. She states (Boehm, 1973:95) that "if salmon were prepared for preserving in earlier times as they were by the Upper Stalo ethnographically, the heads would have been removed before preservation (Duff, 1952:63–64). One would then expect to find an increased percentage of post-cranial skeletal elements relative to cranial elements, if the majority of salmon were being eaten dried or smoked." She goes on to suggest that "such information might also be used as evidence of winter occupation"

(Boehm, 1973:95). It is clear that in her presentation, it is a change in relative proportion that is important, rather than a presence or absence.

Although Frederick (née Calvert, Boehm) did not actually use this procedure in 1973, Wigen (1980:107–108) did, in order to explain the "preponderance of salmon vertebrae" at the Tsable River and Buckley Bay sites. Wigen discusses the possibility that the salmon cranial elements were absent because of their greater fragility, but points out that herring cranial elements and vertebrae were also present, and they are very fragile (Wigen, 1980:107). Wigen notes that it is unclear whether the backbone would usually be expected to be present with the dried flesh, but that the heads would be removed. In a later study using the ca. 800-year-old deposits at the Hoko River Rockshelter, Wigen and Stucki (1988) investigated whether "taphonomic agents" are responsible for aspects of faunal composition. Their research does support the notion that salmon cranial bones are more fragile than vertebrae, as cranial bones are proportionally more frequent in more recent layers than in older layers (Wigen and Stucki, 1988:106). This study indicates that if one finds a decrease through time in proportion of cranial bones, such as found at Crescent Beach, that the true decrease is apt to be greater than that represented by existing remains.

The most thorough study is that by Butler (1990, 1993). Butler reviews a number of ethnographic accounts of processing salmon for storage and points out that the head and body of the salmon were frequently treated separately (Butler, 1993:17–23). One processing technique consisted of stone boiling head and other greasy parts and scooping off the oil (Romanoff, 1985). Her review points out that there are a variety of techniques used but does not contradict Boehm's original statement that the common techniques separate head and backbone portions. It does indicate, though, that in some conditions one might find excessive amounts of cranial parts, where one had a concentration of preserved heads.

In order to evaluate these ideas with empirical evidence, Butler (1990, 1993) looked at one natural and four cultural deposits. She found that even the natural deposit resulted in an underrepresentation of cranial elements, about 30% instead of the 40% expected by the standard skeleton. One interior site (45-DO-285) is represented by only 116 identified elements, 97 of them otoliths, a part of the inner ear (Butler, 1990:110)! Other than this bizarre sample, the cranial vertebrae ratios found by Butler are in accord with Boehm's observation. In particular, the two cultural deposits where one expects fresh fish entering the archaeological record, the Road Cut site at the Dalles reported in Chapter 4, and the Judd Peak Rockshelter, have relatively abundant cranial parts (Judd Peak, 19% cranial, Butler, 1990:146). One of the other two cases, the Duwamish No. 1 site, in Seattle at the mouth of the Duwamish River, has a lesser proportion of cranial bones, at 7%, as expected for a site that included salmon procurement and probable consumption of stored fish in other seasons (Butler, 1993:5). The final archaeological component examined, 45-DO-211, on the upper Columbia River, is a housepit village, dating to between 3600 and 2700 BP (Butler, 1993:5). Pithouse villages on the

plateau are conventionally expected to rely on stored salmon, and this one was occupied when large-scale salmon storage was being established. The tally of only 5% cranial bones (*n* of 345) indicates substantial use of stored salmon. In short, Butler's extensive analysis and review provides support for Boehm's position, although it also points out the situation is more complicated than originally presented.

Butler's analyses lack a component at which a very definite dependence on stored salmon is expected. Croes (1992b:348) presents just such evidence from Ozette where the "head elements" represent just 0.5% of the total identified elements. In the same article he gives the ratio of salmon cranial and postcranial elements from the Hoko River Rockshelter, as reviewed above. It is a limited-activity fishing site where one would expect the fish elements to enter the archaeological record after being freshly caught rather than after being stored. Here the salmon head elements represent 13% of the total identified elements, in accord with the other numbers cited.

In summary, in the 20 years since Boehm put forward her argument, empirical investigations support the usefulness of this measure. As with all procedures, there are limitations and restrictions. It is most reliable if trends at a single site are used, given the issue of fragility and the role of site setting and function in the composition of faunal elements. Seasonality can be seen, as Boehm presents, as another interpretation of changes

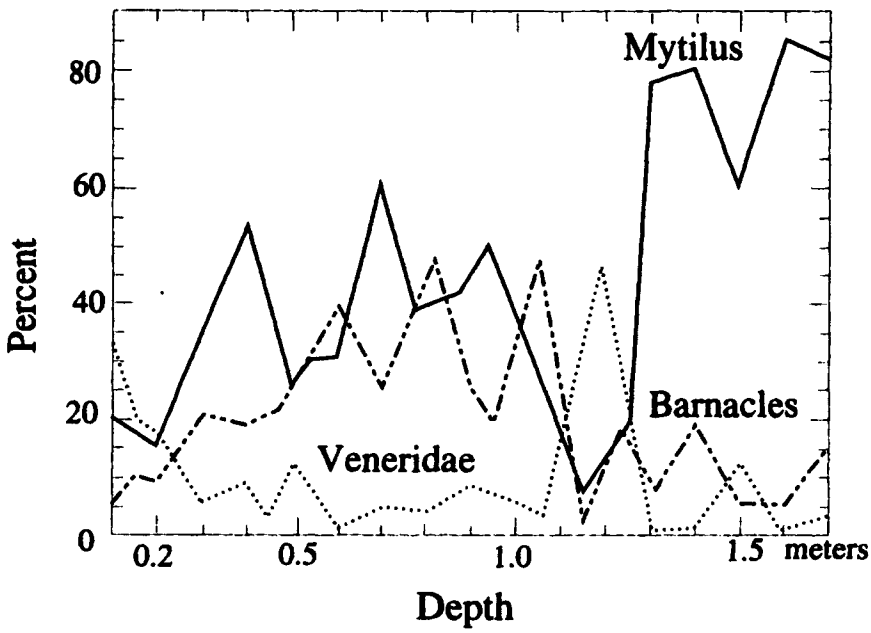


FIGURE 6-5 Locarno Beach shellfish at Crescent Beach; (Locarno Beach Component Approximately 0.8–1.2 m, layers CQ to CT/U).

in this ratio, and in any case needs to be kept in mind. Changes in the nature of the layers should also be controlled, and the definition of *cranial* needs to be clear. Finally, the identifiability of elements differs from analysis to analysis. Still, keeping these caveats in mind, this is a useful procedure and capable of presenting clear answers to the question of salmon storage, such as at Crescent Beach.

Hoko River (Croes and Hackenberger, 1988; Croes and Blinman, 1980; Croes, 1992b) gives a very different picture. The "Wet/Dry" site there was identified as Locarno Beach by Mitchell and, obviously, includes both wet and dry areas. Even though the Hoko River has a salmon run, the percentage of salmon remains are quite low in the Locarno Beach phase deposits, only 16% of identified fish bones, in contrast to the flatfish (mainly halibut) of 45% and "roundfish" of 20% (Croes and Hackenberger, 1988:62). Although this fits their model of flatfish being stored prior to large-scale use of salmon, and reflects the absolute abundance of fish in the area, the proportion of salmon is far lower than the other sites cited above. The investigators suggest that their fish remains are from a spring–summer offshore fishery and thus do not reflect year-round reliance (Croes and Hackenberger, 1988:66), although they do not cite any supporting evidence—other than the relative abundance of fish species.

Recently (Croes, 1992b) has reported that both the salmon and the main flatfish remains recovered from this component have very low proportions of cranial remains. For the salmon this is consistent with the pattern expected for stored salmon obtained elsewhere as described in the sidebar. Halibut is the main flatfish found at Hoko River, much larger fish than starry flounder. The remains of halibut are also found to have very low proportions of cranial elements, which Croes (1992b:447–351) argues to be evidence of storage. Croes's position is supported by the high proportions of cranial elements in other fish categories.

The remains of a structure were also present in the dry portion of the Hoko River excavation (Howes, 1982). It has maximum dimensions of 5 × 6 m, and a single hearth area. It is viewed as temporary and seasonal in accord with the inferred springtime occupation of this component. This informal structure has little in common with ethnographic planked houses, but might be closely related to ethnographic single-family mat-covered summer structures (Howes, 1982:120).

The most recent and detailed investigation of a Locarno Beach component is by Matson at Crescent Beach in 1989 and 1990 (Matson *et al.*, 1991). The detailed subsistence information derived from whole unit samples obtained by water-screening of natural layers presents the best extant evidence of the initiation of the salmon-based storage economy in the Northwest Coast. The excavations at Crescent Beach included Locarno Beach culture deposits in the North Trench (Figure 6-4) and St. Mungo, Locarno Beach, and Marpole layers in an apparently continuous sequence of layers in the

South Trench. In the North Trench the Locarno Beach layers were limited to the "Pithouse" layers, H and Hb, which evidently occurred after a 700-year hiatus in the deposit, and were the last intact layers in that trench.

In contrast to the relatively large number of fish bones (totals in the thousands, Table 6-3) and often abundant shellfish remains, only about 122 mammal remains and 17 bird bones were identified in the 1989 excavations (Crockford, 1991). At Crescent Beach birds and mammals could not have been a major part of the diet.

Analysis of shellfish remains (Rankin, 1991) shows that the general trend in the South Trench (ca. 3700–4000 BP to 2000 BP) is from a dominance of bay mussel (*Mytilus edulis*) in the lower layers giving way to a variety of shellfish in the upper layers. As explained in the sidebar, clams dominate the *Pelecypoda* residual category (unidentified shellfish) and thus are likely more important than mussels in the recent layers (Figure 6-5). The major exception to this trend is Layer CT (very early Locarno Beach) on Figure 6-5. Layer CT is rich in horse clam (*Tresus* spp.) and is the earliest incident of a clam-dominated layer at Crescent Beach. Horse clam abundance is understated, because much of the *Veneridae* (unidentified clam) and *Pelecypoda* categories for this layer are probably also horse clam as well. Rankin (1991:94) noted that because horse clams are found so deep into the sediments, it is unlikely that this species was obtained during the fall and the winter, given the cold temperatures, relatively few low tides, and short hours of daylight in these seasons.

In the North Trench (Figure 6-6), the Locarno Beach "pithouse," layers BC-H, BC-Hb, are quite different in shellfish remains from the St. Mungo layers. In contrast to the St. Mungo layers, mussel dominance is seen only in the smallest screen sizes, with a variety of clams found in the larger screen sizes.

> In the lower layers Rankin identified bay mussel and *Balanus* spp. (small acorn barnacles, not clearly used as food at Crescent Beach, although they were at Hoko River) (Croes, pers. comm.) as dominating the identified shellfish. As described in the sidebar in Chapter 2, bay mussel and barnacles are found in the rocky intertidal zone. These species dominate the St. Mungo layers at Crescent Beach, Glenrose, and the St. Mungo site itself.
>
> Rankin identified three clams, *Saxidomus giganteus* (butter clam), *Protothaca staminea* (littleneck), and *Tresus* spp. (horse clam), all of which begin to be found in significant numbers only in the Locarno Beach layers. Littleneck clam is found in the upper intertidal layers, in clay and gravel in the upper 8 cm of the deposits, butter clam is found in the lower one-third of the intertidal area in sandy or gravelly beaches, and horse clam found 0.5 to 1.0 m below the surface in the lower intertidal zone. The rock cockle (*Clinocardium nuttalli*) was also recognized, a shellfish associated with eel-grass beds. Whelks [*Nucella* (or *Thais*) *lamellosa, N. canaliculata*] were also present; these are often found among barnacles and mussels.

TABLE 6-3 Crescent Beach South Trench Locarno Beach Fish Remains*

Natural layer	Salmon	Sturgeon	Chub/ sucker	Flatfish	Sculpin	Midshipman	Herring	Dogfish	Skate	Perch	Total
CQ	56	0	0	16	0	1	1	0	0	0	74
CR(89)	235	1	2	42	4	1	1	5	0	0	291
CR(90)	537	1	10	169	29	5	19	15	1	0	786
CR-2	324	1	3	86	5	1	3	7	0	0	430
CS	2485	20	13	391	85	7	104	42	2	3	3152
CT	3104	6	14	573	121	10	186	38	0	2	4054
Total	6741	29	42	1277	244	25	314	107	3	5	8786

*All values number of identified specimens (NISP).

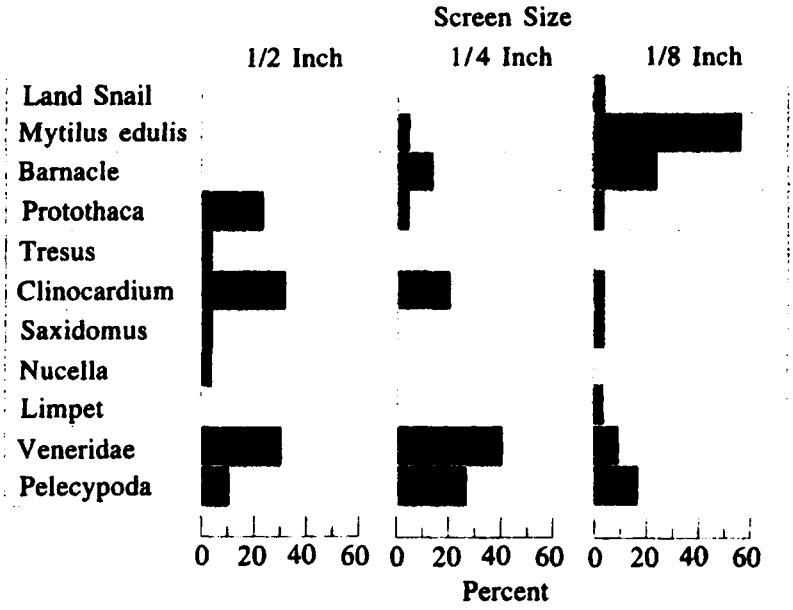


FIGURE 6-6 Layer H shellfish from Crescent Beach.

In addition to these identifiable shellfish classes, Rankin has two other categories, *Veneridae*, that is, shell remains identifiable to clams, but not further, and *Pelecypoda*, unidentifiable shellfish remains. These are remains that are probably mostly clams but could also be whelk or barnacle fragments. The other common category, bay mussel, is identifiable to very small fragments and so usually does not end up in the *Pelecypoda* category. Because bay mussel is so fragile, it breaks into small pieces and usually has a much higher abundance in the smaller (⅛") screen sizes than it has in larger sizes (½" and ¼"). Rankin used three nested screens of those sizes in her analysis, with occasional samples of 1/16" (Figure 6-6). Both rocky foreshores and sandy eel grass beds exist within 1 km of the Crescent Beach excavations, making all the common shellfish relatively accessible today.

The Locarno Beach component at Crescent Beach is characterized by early layers dominated by bay mussels being replaced by layers with higher percentages of clams. The species of clams present indicates a likely springtime procurement. The exceptions to this trend are layer CT and the apparent Locarno Beach pithouse.

Turning to the fish, which are undoubtedly the most important remains, salmon remains dominate, ranging from 67% to 81% in the South Trench Locarno Beach layers (Table 6-3). This is a significant increase from the preceding St. Mungo layers, where salmon ranged from 41–66%, given the large sample sizes (Matson, 1992; Crockford and Wigen, 1991).

Flatfish, the second most important fish, is nearly all, if not all, the very tough-skinned starry flounder. This fish, when mature, ranges from 1–5 kg in size, and is easily obtained in the spring when it moves inshore. Its size is of the same order as most of the Crescent Beach salmon, but it is most available in the spring rather than the late summer and fall like salmon. It cannot only be obtained by hook and line but can also be speared in shallow waters. The shallow waters of Boundary Bay are ideal places to obtain the starry flounder.

If we examine the relative abundance of the salmon and flatfish (Table 6-4), in the South Trench St. Mungo layers the numbers are approximately equal, with each accounting for 35–47% of total fish. Because both fish are approximately the same size, this indicates that they contributed approximately equally to the diet. In the Locarno Beach layers, salmon ranges from 68–81% of the total fish. Salmon thus increases in importance through time at Crescent Beach.

This general trend supports the idea of a broadscale and localized fishing adaptation during St. Mungo times postulated by G. Frederick, as reviewed earlier. This adaptation is replaced by one focused on harvesting and storing salmon, apparently achieved at Crescent Beach during Locarno Beach times. The wide range of minor fish species found in the St. Mungo

TABLE 6-4 Salmon versus Flatfish Element Distribution, Selected South Trench Layers, Crescent Beach Site (Layers CR90)*

Fish	Layer CR(90)	CS	CT	CV	CW	CX-1	CY	Total
Flatfish								
Skull	7	19	26	6	28	90	57	136
Suspensorium	35	128	178	38	80	357	197	621
Pectorial girdle	11	32	43	10	28	123	64	177
Vertebrae (whole)	72	208	350	80	245	1280	508	1391
Caudal (tail assemblage)	3	4	9	0	7	29	12	32
Total	128	391	606	134	388	1879	838	2357
Salmon								
Undetermined	0	27	13	3	22	199	14	279
Skull	0	2	15	5	5	49	8	84
Suspensorium	0	3	9	0	10	28	5	55
Teeth/gill raker	10	49	101	4	4	40	74	272
Pectorial girdle	14	23	34	5	13	55	27	171
Vertebrae (whole)	148	517	643	79	256	656	165	2464
Caudal (tail assemblage)	11	63	90	19	52	180	68	481
Total	183	684	905	115	362	1207	361	3806

*The values above do not include indentified but fragmentary vertebrae.

layers at Crescent Beach is much reduced in the Locarno Beach layers (Table 6-3). The relative concentration of salmon, and a relatively restricted range of fish, found in the later Locarno Beach (and Marpole) layers contrasts with the St. Mungo layers.

Salmon cranial bones are concentrated in the lower layers at Crescent Beach. They are found in the lowest St. Mungo layers of the South Trench and end in layer CS in the earliest Locarno Beach layers (Table 6-4). If the presence of head parts is indicative of immediate procurement (see sidebar), then the later Locarno Beach layers have the remains of stored salmon only.

In contrast with this trend in salmon head bones, there does not appear to be any trend in flatfish cranial parts, which are relatively equally present throughout the site, usually being a significant proportion of the total identified flatfish bones. This pattern is most simply interpreted as local procurement and consumption of flatfish throughout the occupation of Crescent Beach.

The North Trench "pithouse" layers BC-H and BC-Hb provide an exception to the absence of significant numbers of salmon cranial parts between 2000 and 3300 years ago. Here, nearly 14% of the 712 salmon bones are identified as cranial (Table 6-5). Thus these two layers, radiocarbon dated to 3000 years ago, represent a time when salmon was being procured and

TABLE 6-5 Fish Remains from Layers BC-H and BC-Hb (Locarno Beach Component) UNIT Esw, Crescent Beach Site[a]

Fish	Layer BC-H	Layer BC-Hb	Total
Sucker	2	1	3
Sucker/minnow	6	3	9
Perch	12	4	16
Staghorn Sculpin	26	5	31
Sculpin ssp.	60	19	79
Herring	97	136	233
Midshipman	4	0	4
Eulachon/smelt(?)	6	6	12
Anchovy	20	5	25
Flatfish	456	124	580
Salmon	444	258	702
Dogfish	87	26	113
Skate	8	0	8
Unident. skull	51	11	62
Unident. vert.	72	20	92
Totals (identified)	1228	587	1815
Totals (unidentified)	123	31	154

[a]All values number of identified specimens (NISP).

consumed, and not being introduced into the deposit after being stored. Given that the seasonality evidence for other Locarno Beach layers at this site is for the spring when fresh salmon were not available, this presence of salmon head bones substantially supports the inference that these "pithouse" layers are the result of a much longer-duration occupation than the layers elsewhere in the site in the period from 3500 to 2400 years ago.

If the interpretation that the pithouse fill was the result of a single long-duration occupation episode is correct, then the fish remains should reflect the seasons within this occupation. During excavation, the pithouse fill was stratigraphically divided into two layers (Figure 6-3), BC-Hb (close to the pithouse floor, very finely broken bay mussel midden with lots of ash and fire-cracked rock), and above that, layer BC-H, (less fragmented mussel midden with a lower density of fire-cracked rock). If, in fact, these two layers are sequential seasonal deposits beginning in the late fall or early winter, one would expect more salmon and herring in Hb, and more flatfish and fish associated with shellfish gathering (midshipman, sculpin) in H.

We find that these expectations are largely affirmed (Table 6-5). Salmon are more frequent in layer Hb than in H. Herring, likewise are definitely more common in Hb (23%) than H (8%). The 23% herring presence in layer Hb is nearly twice the highest percentage found in any other layer in the site, indicating a winter-occupation layer. Flatfish show a reverse trend, and in fact go from 21–37% of the total identified fish. Midshipman and sculpin are also more abundant in H, the later layer. Furthermore, there are more other fish species remains in these layers than found elsewhere in Locarno Beach layers, which would be predictive of a long-term occupation.

The fish remains support the inference that Feature 9 (Figure 6-3) is indeed a winter-occupation layer, a pithouse, and that the sequential layers are from winter to early spring. This rather small and insignificant (ca. 4 m in diameter) winter dwelling contrasts with the large houses seen in ethnographic times or with contemporaneous habitations on the Skeena River (Coupland, 1985a, 1988a), or even the structure reported in Chapter 5 at Hatzic Rock (A. Mason, 1994).

Most other Crescent Beach Locarno Beach layers (Table 6-3)—with abundant flatfish, some herring, midshipman, and the lack of salmon head bones—indicate that Crescent Beach was used as a springtime fishing and shellfish gathering camp. The dominant salmon would have been procured and processed elsewhere in the fall, and transported to and consumed at Crescent Beach in the spring.

The detailed evidence from the Locarno Beach layers at Crescent Beach for the processing and storage of salmon is in agreement with the less definitive evidence elsewhere reviewed previously. Locarno Beach, then, is the earliest period that has good evidence for large-scale processing and storage of salmon, and the first good evidence for salmon "intensification"

in Matson's terms (1983), or for a salmon-based storage economy in Croes and Hackenberger's (1988) terms.

At Crescent Beach the increase in salmon and decrease in flatfish are correlated with changes in shellfish (Figure 6-7), and with the introduction of abundant quartz microliths. The occurrence of quartz microliths, quartz or obsidian microblades, or both is frequently associated with Locarno Beach sites, including Bowker Creek (Mitchell, 1979), Georgeson Bay (Haggarty and Sendey, 1976), Crescent Beach (Trace, 1981; Matson *et al.*, 1991), Musqueam NE (DhRt 4) (Matson, 1974), and Montague Harbour (Mitchell, 1971b). Flenniken (1980, 1981) and Croes and Blinman (1980) have argued that these microliths were used in processing fish, mainly the initial cutting of the skin. If salmon were going to be processed in large numbers in a short time, one would expect specialized tools to appear. Later, ground slate knives were probably used for this function, as well as for slicing the flesh. Ground stone has the advantage that it can be resharpened in the haft, thus enabling processing to occur with little interruption, an insight made by Hayden (1977, 1981, 1989) for ground stone tools in general, but of particular importance for the Northwest Coast where rapid processing of salmon is so important. It is no surprise that in Locarno Beach times we find the first widespread occurrence of ground slate knives, although many of them are thick and crudely made.

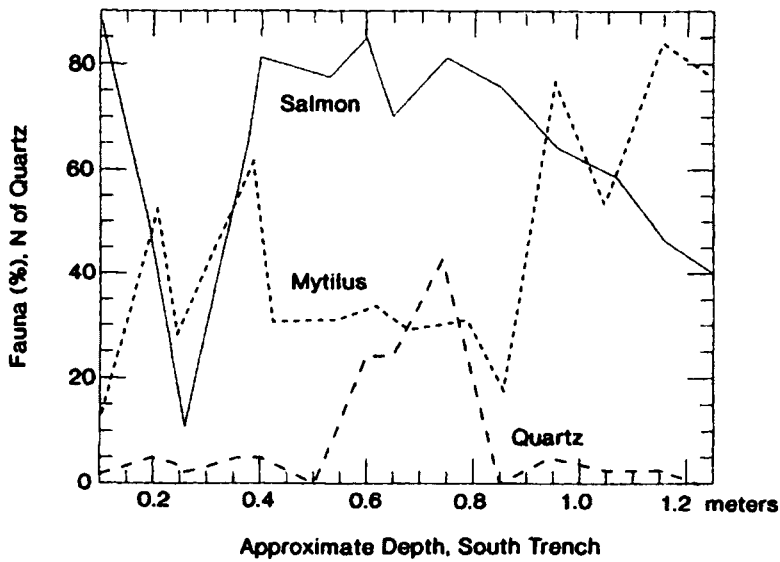


FIGURE 6-7 Proportion of salmon (of fish), *Mytilus* (of shellfish) and abundance of quartz crystal plotted against depth, South Trench, Crescent Beach. (Locarno Beach component approximately 0.6–1.1 m).

To summarize, the evidence from Locarno Beach indicates that the Developed Northwest Coast Pattern subsistence pattern is established by the middle of this phase. The large-scale use of stored salmon is clearly established at Crescent Beach and less definitely at a number of other sites. The presence of special-purpose sites indicates a shift away from the "broad-scale" pattern evident in the previous St. Mungo phase (Christenson, 1980; Frederick, pers. comm.) and to a storage economy based on fish (Croes and Hackenberger, 1988), or salmon intensification (Matson, 1983). Not only are subsistence remains, inferred site seasonality, and functions in accord with such a shift, but also the changes in the artifact assemblages.

Locarno Beach Related Sites

In Chapter 5 the Obsidian Culture, as defined by the Northwest Coast ethnologist and archaeologist, D. H. Mitchell, was treated as a member of the preceding stage. We noted, however, that the published radiocarbon dates extended into the time period occupied by Locarno Beach. It may be that this culture extends through both periods, or that it dates only to one or the other. Given that its radiocarbon assays date to 3000–2500 BP, the Obsidian Culture should also be briefly reconsidered here, as it is in the sidebar.

> The Obsidian Culture (Mitchell, 1988a, 1990) shares a number of artifact types with Locarno Beach: microliths, composite harpoon valves, and mussel shell tools, as well as bone points. Differences between the two result mainly from the Obsidian Culture's lack of ground stone tools—although not all Locarno Beach components have ground stone tools—stone celts, labrets, ground stone celts, and the Gulf Complex items. If Mitchell is correct that the Obsidian Culture includes material older than Locarno Beach, it may be the source of the composite toggling harpoon for the latter.
>
> The existing subsistence information, reviewed in the last chapter, is more in accord with the St. Mungo subsistence pattern than that found in the Locarno Beach. Not only is the amount of salmon in the reported Obsidian Culture components much less than found in later components, but a relatively broad range of fish is also present. The current evidence, though, is not definitive enough to reliably infer the Obsidian Culture as either storage or nonstorage. The exact relationship between the Obsidian Culture and Locarno Beach also remains to be convincingly delimited.

Two other sites on the west coast of Vancouver Island also show affinities with the Locarno Beach phase, Shoemaker Bay I (McMillan and St. Claire, 1982) and a site at Ucluelet (Arcas, 1991a). Shoemaker Bay is at the head of the long Alberni Inlet (Figure 7-10), almost in the middle of the island, in historic Wakashan territory. Shoemaker Bay I has one radiocarbon date

of 2860 ± 90 (Gak 5104) BP that should date initial intense occupation (McMillan and St. Claire, 1982:61). In addition to the date, this component has a number of clear affinities with Locarno Beach, including leaf-shaped and stemmed points, quartz crystal microblades, and leaf-shaped ground stone points. Crude ground stone knives (ground only along the edges), shaped abrasive stones, and stone celts are also present. There is one probable labret fragment, composite toggling harpoon valves, and bone chisels. A long rocked-lined trench was also found in this component. All in all, a very impressive number of similarities with the Gulf of Georgia region, and specifically with the Locarno Beach phase. We agree with the authors, however, that the overall similarity in artifacts and dating is greatest with the succeeding Marpole phase (McMillan and St. Claire, 1982:93).

McMillan and St. Claire (1982:13) point out that there is evidence that prior to the nineteenth century this area was Salishan. This observation fits with an obvious inference that Locarno Beach is an early Salishan culture. We will show, later in this chapter, however, that this question of ethnicity may not be so simple.

At Ucluelet, on the west coast of Vancouver Island, at the north edge of the mouth of the sound that Alberni Inlet opens into, is the Little Beach site (DfSf 100), which also has Locarno Beach similarities (Arcas, 1991a). This site is on the outer coast, 70 km west of Shoemaker Bay, deep within Nootka territory, and at the time of writing only an exploratory analysis had been done. Four radiocarbon dates, ranging from 4000 to 2500 BP, indicate a deposit of Locarno Beach age that includes burials with cairns, a huge labret, large leaf-shaped bifaces, a ground slate projectile point, cobble chopper, and a number of bone artifacts. Although this is a small collection, its affinities are far closer to Locarno Beach—and Shoemaker Bay I—than the finds 100 km to the north along the coast at Yuquot. Yuquot, which we turn to next, has coeval remains that are usually thought to be ancestral to the Nootka.

Zone II at the Yuquot site (Dewhirst, 1980) is dated from 3000 to 1200 BP, and thus overlaps several Gulf of Georgia culture types. It is striking, though, how little chipped stone is present. Instead there are numerous abrasive stones of a variety of shapes and materials, and many bone tools, including a variety of composite toggling harpoons. Stone celts first appear at the bottom of this zone. This material does not fit well with the Gulf of Georgia material, nor the Obsidian Culture, indicating that there may be a separate archaeological tradition on northwestern Vancouver Island. This raises the question of ethnicity, to which we have alluded to briefly above with Shoemaker Bay I.

For the Locarno Beach period we have two relatively large samples of perishables (Figure 6-8) from Musqueam NE (DhRt-4), a Locarno Beach component on the Musqueam Reserve in Vancouver (Borden and Archer, 1974; Borden, 1976; Archer and Bernick, 1990) and Hoko River (Croes and

Blinman, 1980). In spite of a number of technological similarities, these two sets of basketry are definitely different at a level that would lead one to expect differences in "ethnicity" (Croes, 1987, 1989a; Bernick, 1987) as briefly explained in the sidebar. In particular, plaited wrapped twining (Figure 6-8F) is dominant at DhRt-4 and rare at Hoko River (Bernick, 1987:255).

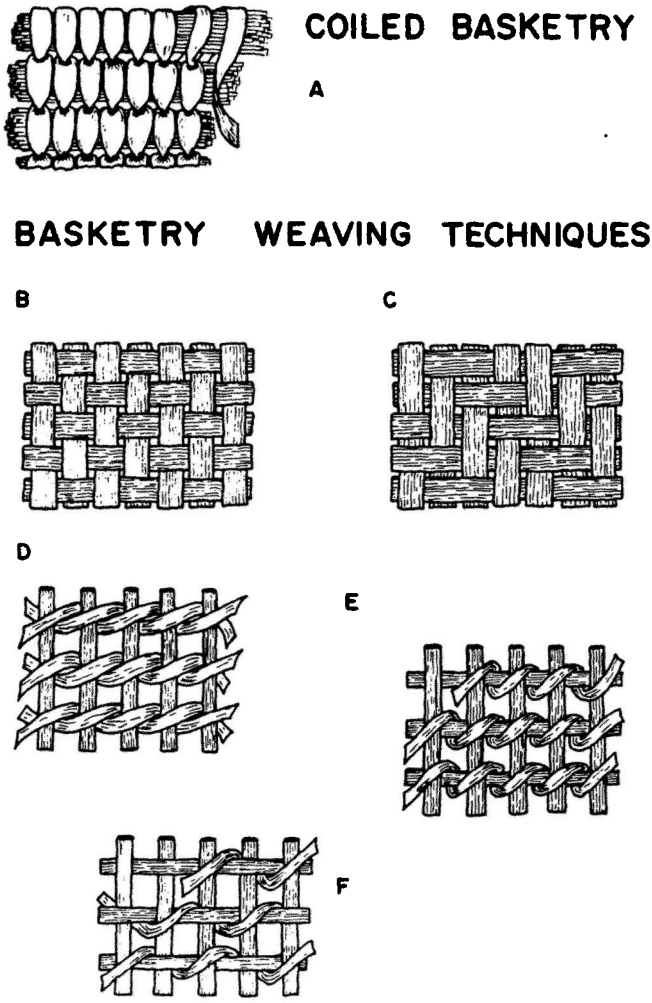


FIGURE 6-8 Basketry styles from the prehistoric Northwest Coast (From Bernick, 1987). (A) Split stitch bundle foundation; (B) checker plaiting; (C) twill plaiting; (D) twining; (E) wrapped twining; (F) plaited wrapped twining. (F) is the most common type at Musqueam NE (DhRt 4), (B and D) at the Water Hazard site.

> Because basketry is an additive technology, with a variety of arbitrary, nonfunctional attributes (coil or spin to the left or the right), it is very sensitive to cultural preferences and reflects ethnic differences more closely than other archaeological information (Adovasio, 1980). By "additive" we mean that the various steps involved in making the basket are all preserved in the final product, in contrast with "subtractive" technologies, such as chipped stone and ground stone, where only the final shape is visible (Deetz, 1967). In basketry many steps, such as twisting to the left or right, are essentially arbitrary, and thus can vary independently of function, and so can encode normative habits of local groups. It is usually assumed that it is for these reasons that basketry technology and style reflects ethnicity so closely.
>
> In Northwest Coast ethnographic collections close twining (Figure 6-8D) with stitches leaning to the left are found among the Haida and Tlingit, and twill plaiting (Figure 6-8C) and open weaves of wrapped twining (Figure 6-8E) are abundant in Coastal Salish and Wakashan collections. Further details appear to separate out finer ethnic distinctions. The ethnographic confirmation of a close relationship between basketry techniques and ethnicity on the Northwest Coast justify inferring that basketry likely reflected ethnicity in prehistoric times as well.

Croes (1987, 1989a) has used the observation that the Hoko River basketry and other perishables are distinctively different from the Locarno Beach perishable material recovered from Musqueam NE (DhRt 4) to argue for the antiquity of current linguistic divisions on the Northwest Coast. The Hoko River area today is Makah, which belongs, along with Nootka and Kwakiutl, to the Wakashan language family. He further (Croes, 1989) suggests that cultural complexes such as Locarno Beach are "economic stages" or "plateaux" that are expressed slightly differently by different ethnic groups. Thus, he sees no discord in considering Hoko River both a member of the Locarno Beach culture and different ethnically from the Coast Salish Locarno Beach as seen at Musqueam NE.

We find this an interesting and provocative perspective that needs to be carefully evaluated. We wonder, though, about the utility of applying this idea widely at this point. If we have a series of "Locarno Beach" components that are Coast Salish in ethnicity, and others that are not, should we not distinguish between them? Furthermore, might not the Obsidian Culture be the same "economic pattern" as Locarno Beach? Might it then be considered "Locarno Beach plateau, Obsidian Culture type"? It is clear that we are now about to enter a new, exciting era in archaeological cultural classification on the Northwest Coast, but we have not yet established a procedure to integrate this material into our existing archaeological terminology. Hence our reluctance to call "Locarno Beach-like" assemblages away from the core Salish area Locarno Beach without them being large and well described. Given the apparent ethnic differences indicated by the perishables between Hoko River and Musqueam NE (DhRt 4), it is too soon

to equate Locarno Beach-like assemblages at Alberni and Ucluelet as definite evidence of Salishan occupation 3000 years ago.

After reviewing events west of the Gulf of Georgia it might make sense to turn to coeval manifestations inland, in the lower Fraser valley. After all, we saw earlier that these two areas share the same Charles culture, and at contact times, the lower Fraser valley was clearly within the Northwest Culture area. We are unable to do so because of the confusion that exists in the lower Fraser valley. This was brought home to us in our recent work at the Scowlitz site, at the junction of the Harrison and Fraser rivers. It is very difficult to classify this material with other inland material, let alone figure out the correspondence with coastal cultures. One of the main problems has to do with the importance of bone and antler industries in the coastal assemblages and their absence in the inland areas because of the lack of protective shell middens. Another factor is the continuation of chipped stone industries in the interior after they had been reduced to almost nonexistence in the Gulf of Georgia. The result is that, although some general trends can be seen, a more detailed comparison between inland and coast assemblages cannot be made for most of the last 3500 years (e.g., Mitchell, 1990). For these reasons, only the occasional reference will be made to lower Fraser valley archaeology in the remainder of this book.

There is, though, a scheme based on the sites in the lower Fraser canyon excavated by Borden (1968a). Mitchell (1990:348–351) reviews the last 3700 years of this regional sequence and the more recent, more completely reported archaeological investigations. Similarly, the Lower Columbia Valley archaeology appears to be significantly different from the coast (Pettigrew, 1990:518–519), and not having firsthand experience with the archaeology, we doubt that we would do more than add confusion. Pettigrew (1990) has reviewed the archaeology of the lower Columbia valley, which begins only 2500 years ago.

South Coast

We have not been able to find an equivalent of this stage on the southern Northwest Coast. The apparent salmon economy without other aspects of the Developed Northwest Coast Pattern has not yet been identified there. Given that the previous stage of initial coastal adaptation had only been found in the 1980s, we hesitate to state that the stage equivalent to Locarno Beach does not exist there. If it does, we suspect that it will be found to be part of the material treated in Chapter 7, as full-blown Developed Northwest Coast Pattern, material usually seen as dating in the last 2500 years.

Labrets and Status in the Locarno Beach Phase

In Chapter 5 we indicated the possible presence of labret wear in several burial collections, both on the North Coast (Queen Charlotte Islands) and

in the Gulf of Georgia area, but noted the lack of labrets in the archaeological record in the latter area. Our review in this chapter shows numerous labrets among the various assemblages of Locarno Beach age, and a number of burials also show labret wear. Labrets have often been seen as indicating status, either achieved or ascribed status, depending on their context, and thus the occurrence of labret use is important in deciding whether ascribed status was present in the Locarno Beach phase. A review of labret wear by Cybulski (1991) provides important information about this topic.

First, labret wear is not always distinctive, and in Cybulski's (1991) reexamination of a number of collections, he found both unreported labret wear and none where others had previously reported wear. From Crescent Beach, out of 35 burials with complete enough jaws and teeth, 14 individuals, 8 males and 6 females, showed labret wear. Most if not all of these burials can be attributed to the Locarno Beach phase, and all but one were mature adults. Only two of the burials Cybulski inspected from Pender Island had what he considered labret wear, although previous work suggested that six had labret wear (Cybulski, 1991:7). One of these two was the burial referred to in Chapter 5 dated at 5170 ± 220 BP. One of these two burials was male and the other female.

Thus, during Locarno Beach times, labret use was common by both adult males and females in the Gulf of Georgia area, contrary to earlier reports (Percy, 1974; Beattie, 1980; Ham, 1982:86–87; Mitchell, 1990). If labret use occurred in earlier times in the Gulf of Georgia area, it was rare, or involved materials that did not preserve or leave evidence of their use on lower jaws. Labret use during Locarno Beach is very different from the historic use by adult females along the north coast. The north coast ethnographic pattern has been verified by Cybulski (1991, 1992) in an analysis of burials from Greenville on the Nass River, which dates from 1400 to 650 BP. All individuals from a sample of 30 with labret wear were females. Also in contrast to the next phase (Marpole), cranial deformation appears to be absent during Locarno Beach times, in spite of statements to the contrary (Beattie, 1980). A review of Northwest Coast burial patterns (Burley and Knusel, 1989) concluded that there was no good evidence of inherited status in burials from this period, in contrast to the succeeding Marpole phase. Whether labrets were indicative of ascribed status during Locarno Beach times may remain an open question, but at this time there does not appear to be definitive evidence in favor of such an interpretation.

Summary of the Locarno Beach Phase

The Locarno Beach phase is an exciting one in Northwest Coast prehistory. The original interpretation of it as a basal culture, with significant sea mammal hunting and Eskimo influence, can no longer be maintained. It is, however, the first culture on the central coast having enough shared

traits with the Northwest Coast ethnographic cultures to be considered a potential member of the Developed Northwest Coast Pattern. Other coeval cultures are recognized from Yuquot and the Queen Charlotte Strait and, although they are yet to be well described, appear to be at a similar developmental stage as Locarno Beach. New traits found in these cultures are conclusive evidence of a stored salmon economy, including specialized seasonal sites (Crescent Beach, Hoko River, Bowker Creek), the full range of ethnographic technologies, and the first widespread use of potentially status-related ornaments (labrets). We also find the first common use of burial goods (beads) and the first use of burial cairns, both of which have been interpreted as indicating status. Still, the lack of definite evidence for ascribed status, winter villages, large multifamily houses, and other aspects of the Developed Northwest Coast Pattern indicate that the Locarno Beach culture had not yet fully reached this developmental stage. One might argue that these traits might yet be discovered for this culture. However, the sole winter domestic structure known for this period (Crescent Beach), seems to be minimal indeed. Interestingly enough, though, the evidence from the north coast, indicates that the Developed Northwest Coast Pattern stage had not been fully reached there either, although a different set of traits are present.

THE NORTH COAST

Although no culture on the northern coast is as well known as Locarno Beach, a similar stage of development is present. Of particular interest is the village of rectangular, multifamily houses at Kitselas Canyon during the Paul Mason phase (3200–2700 BP). At about the same time early Period II assemblages at Prince Rupert Harbour show changes in subsistence adaptation and settlement pattern (MacDonald and Inglis, 1981) that appear to parallel the developments at Kitselas Canyon. Evidence of new fish procurement strategies associated with more intensive production is seen at weir sites in southeastern Alaska (Moss *et al.*, 1989, 1990). Elsewhere on the northern coast, cultural changes on the Queen Charlotte Islands beginning about 3000 BP suggest increasing interaction with mainland cultures (Severs, 1974a; Fladmark *et al.*, 1990:237). This period on the north coast witnesses the introduction of permanent villages of multifamily houses, intensive exploitation of fish resources, especially salmon, and large-scale storage, all core elements of the Developed Northwest Coast Pattern.

Lower Skeena River

The Paul Mason Phase at Kitselas Canyon (Figure 6-9) (Coupland, 1988a:237–239) represents the first clear evidence of settled village life

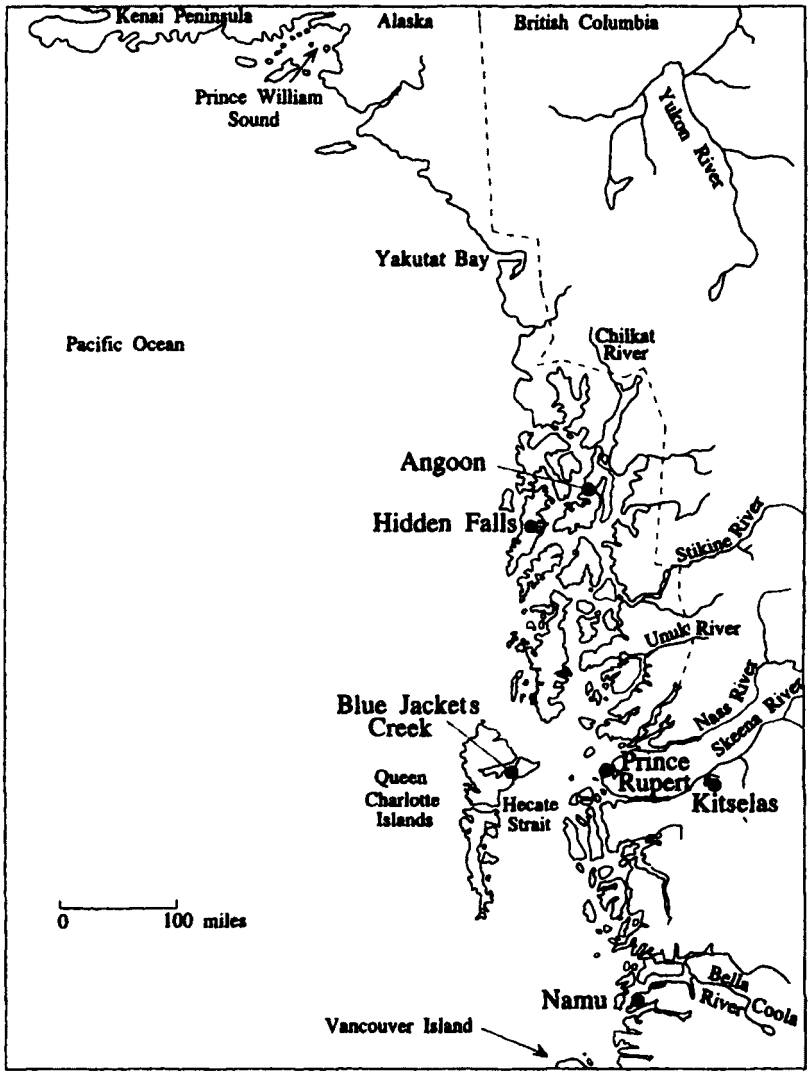


FIGURE 6-9 North Coast sites dating from 3500 to 2400 BP.

anywhere on the Northwest Coast, with five radiocarbon dates between 3230 ± 160 (SFU 134) and 2750 ± 90 (WSU 2922) BP. There, deep rectangular house depressions (Coupland, 1985a, 1988a) were occupied by multifamily households, whereas the arrangement of the dwellings, side by side in two rows, is indicative of a planned village structure (Figure 6-10). The origins of the Paul Mason phase are unclear because of the questions concerning the cultural affiliation of the preceding Skeena phase (see sidebar),

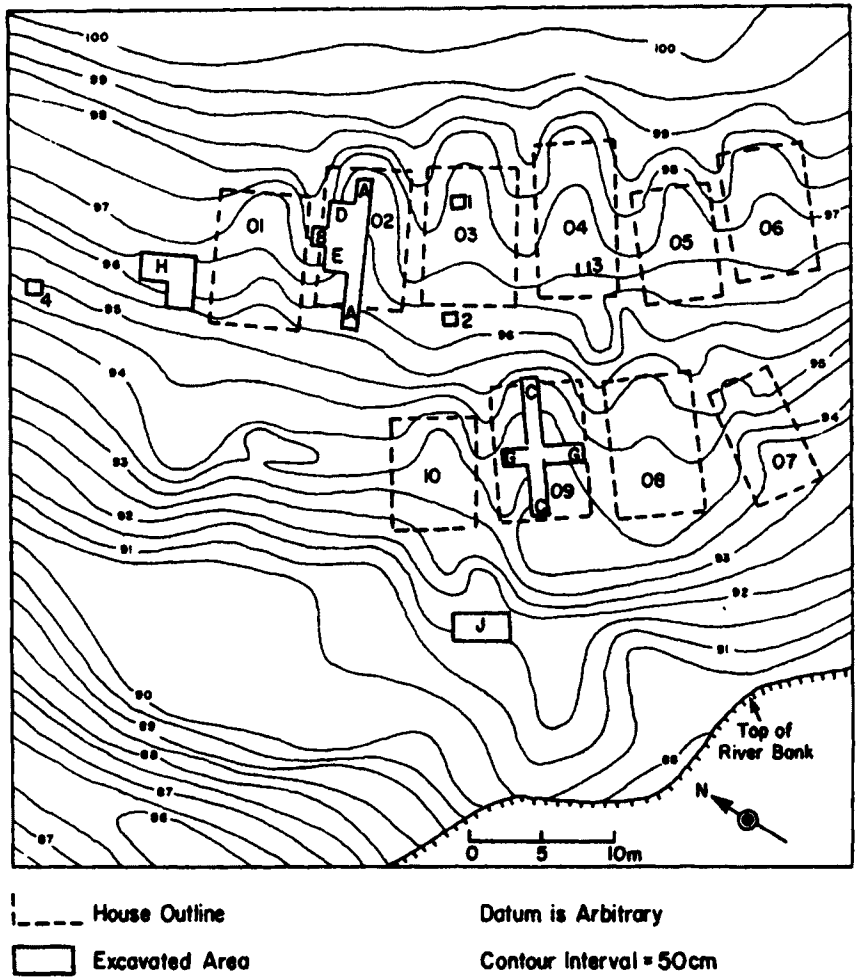


FIGURE 6-10 Paul Mason site house structures.

but there can be no doubt about the orientation of the Paul Mason phase to coastal cultures, as seen in the typical coastal nature of the ground stone technology and the village layout.

> If the Skeena phase represents a downriver migration of interior people, as suggested by Allaire (1979) and Ives (1987), then the origins of the Paul Mason phase could be explained either as the result of strong coastal influences on these interior groups, or as a replacement of the interior population at Kitselas Canyon by a coastal group. Allaire (1979:49) proposed coastal acculturation as the mechanism of change on the lower Skeena following the Skeena phase, noting that the impact of the more

complex coastal cultures on their interior neighbors was an ongoing process in historic times. The absorption of some Athapaskan-speaking Carrier groups by the Tsimshian-speaking Gitksan who lived just downriver is a good example of this process. Ives (1987:221) appeared to suggest that the apparent differences between the Skeena phase and the subsequent Paul Mason phase resulted from coastal groups expanding upriver, not to absorb the interior groups at Kitselas Canyon, but to wrest control of the canyon from them.

The coastal acculturation and replacement theories of the origins of the Paul Mason phase rest on the premise that the Skeena phase represents an interior occupation of Kitselas Canyon, probably by speakers of an Athapaskan language. If, however, the Skeena phase was part of a long-term, gradually evolving coastal–lower Skeena settlement system, as suggested by Coupland (1988a), a different explanation for the origins of the Paul Mason phase emerges. In this model the Paul Mason phase represents an *in situ* cultural development involving a narrowing economic focus with intensive exploitation of a single resource, salmon, and a more sedentary pattern of settlement.

Technologically, the most notable change in the Paul Mason phase is a sharp reduction in the proportion of formed chipped stone tools from the

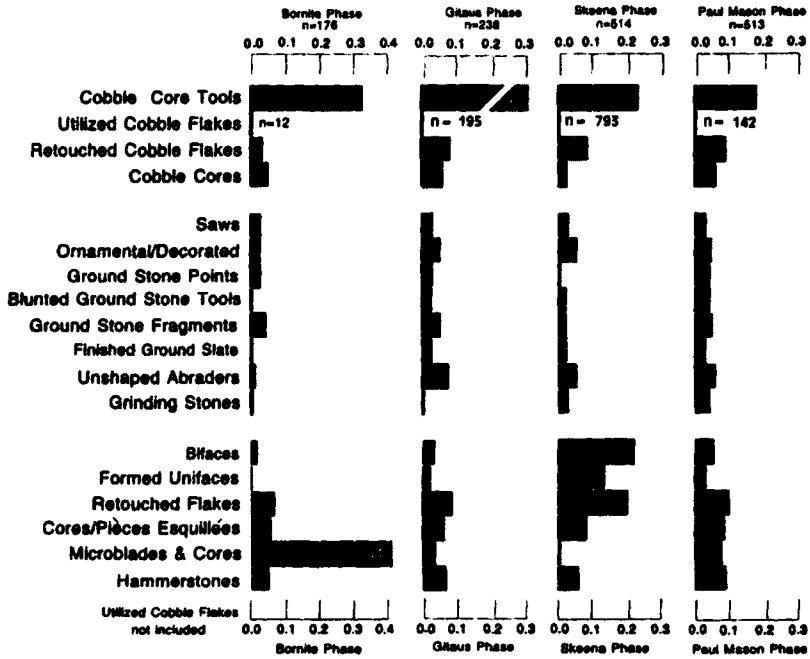


FIGURE 6-11 Paul Mason site components: Bornite, Gitaus, Skeena, and Paul Mason phases. (After Coupland, 1988a.)

preceding Skeena phase. Chipped bifaces, formed unifaces, and retouched flakes (Figure 6-11) account for 46% of the Skeena phase lithics, but only 17% in the Paul Mason phase (Coupland 1988a:231). Ground stone tools increase in proportion during the Paul Mason phase, with the greatest increase seen in shaped and unshaped abraders, now 12% of the lithic assemblage (Figure 6-12). The high proportion of abraders is probably related to increases in the proportion of bone and antler tools, although poor organic preservation at the Paul Mason site precluded the recovery of such items. Because the number of finished ground stone tools other than abraders is modest, it is unlikely that the abraders were primarily used to fashion other ground stone tools. Pebble tools continued to be about as important in the Paul Mason phase (19% of the lithic assemblage), as they were in the Skeena phase (21%), which may indicate continuity.

One class of artifacts conspicuous by its absence during the Paul Mason phase are those that are usually considered to be personal wealth or prestige items. These "wealth" items do appear in later components at Kitselas Canyon and at Prince Rupert Harbour, but not in the Paul Mason phase.

In general, the technological changes seen at Kitselas Canyon during the Paul Mason phase, including higher proportions of ground stone, bone, and antler tools, and lower proportions of chipped stone tools relative to the Skeena phase, are probably related to changes in subsistence strategy, including increasing reliance on salmon. This inference is supported by the analysis of limited faunal remains from cooking hearths at the Paul Mason site, the only context in which faunal elements are preserved. Eighty percent of the identified elements from hearths were from salmonids (Roberts, 1984). Moreover, the presence of undated cache pits associated with the site, are also in accord with salmon storage, as salmon is the most common resource stored in cache pits in ethnographic interior cultures (Teit, 1900).

The most important cultural feature of the Paul Mason phase is the presence of prepared house floors (Figures 6-11, 6-13), the first evidence of permanent residential structures at Kitselas Canyon, and the first indication of permanent villages anywhere on the Northwest Coast. The 10 house floor areas were recognizable as "U-shaped" depression features dug into a rather steep slope that extends back from the top of the vertical wall of Kitselas Canyon. From the shape of these features, the dwellings appear to have been rectangular, averaging about 10 × 5 m.

The Paul Mason site village houses are arranged in two rows, with four houses in the front row and six in the back row, all facing the river (Figure 6-11). The houses in each row were relatively equally spaced, approximately 1–2 m apart, with a "street" separating the front row from the back row. The formality and permanence of this arrangement is remarkably similar to historic Northwest Coast villages.

Two house depressions were partially excavated at the Paul Mason site, one in the back row, and one in the front row. Internal features were con-

sistent (Figure 6-13), indicating that household organization was fairly standardized. Each house had a long, narrow sunken floor area that extended along the midline of the house from front to back. Within this area was a large hearth located roughly in the center of the house floor and a second smaller hearth near the front or down-slope end. Scatters of lithics, includ-

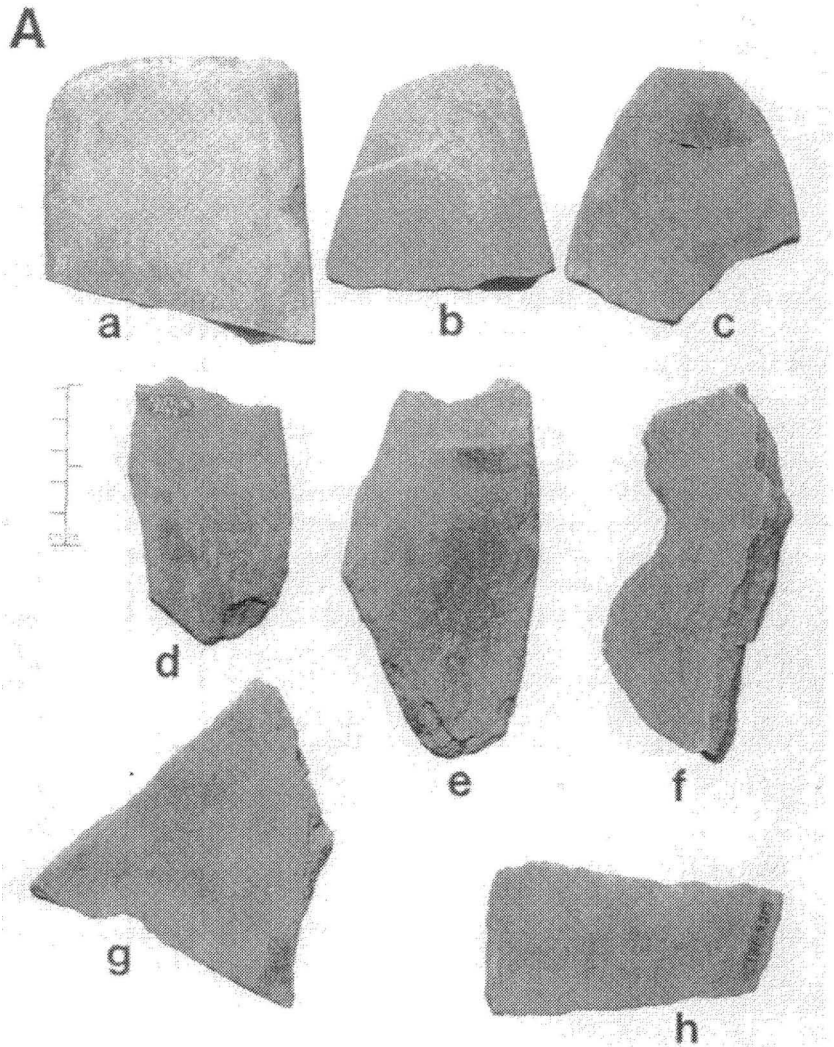


FIGURE 6-12 Paul Mason component artifacts. (A) (a, b, c) shaped abrasive stones; (d–h) unshaped abrasive stones. (B) (a, b) polished hematite speroids; (c–e) spherical stones; (f) slate disk bead; (g) mica fragment; (h) highly polished fragment; (i) incised tablet; (j) bird effigy, (k) ribbed stone. (From Coupland, 1988a.)

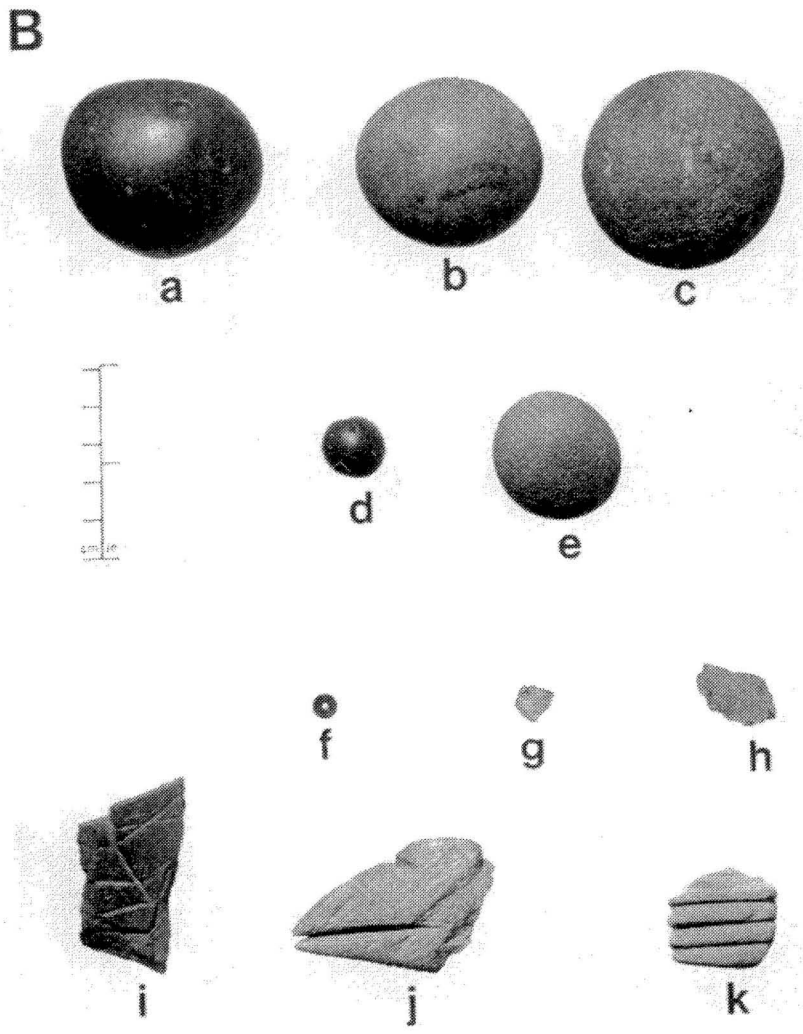


FIGURE 6-12 (*Continued*)

ing abundant fire-cracked rock, surrounded the hearths, and postmolds were found along the midline of the floors, probably supports of a central ridge pole for a gabled roof. Raised earth benches ran the length of the houses on either side of the sunken central floor areas giving the house floors a two-tier effect. These benches may have been used for sleeping and storage, as similar areas had these uses according to ethnographic accounts.

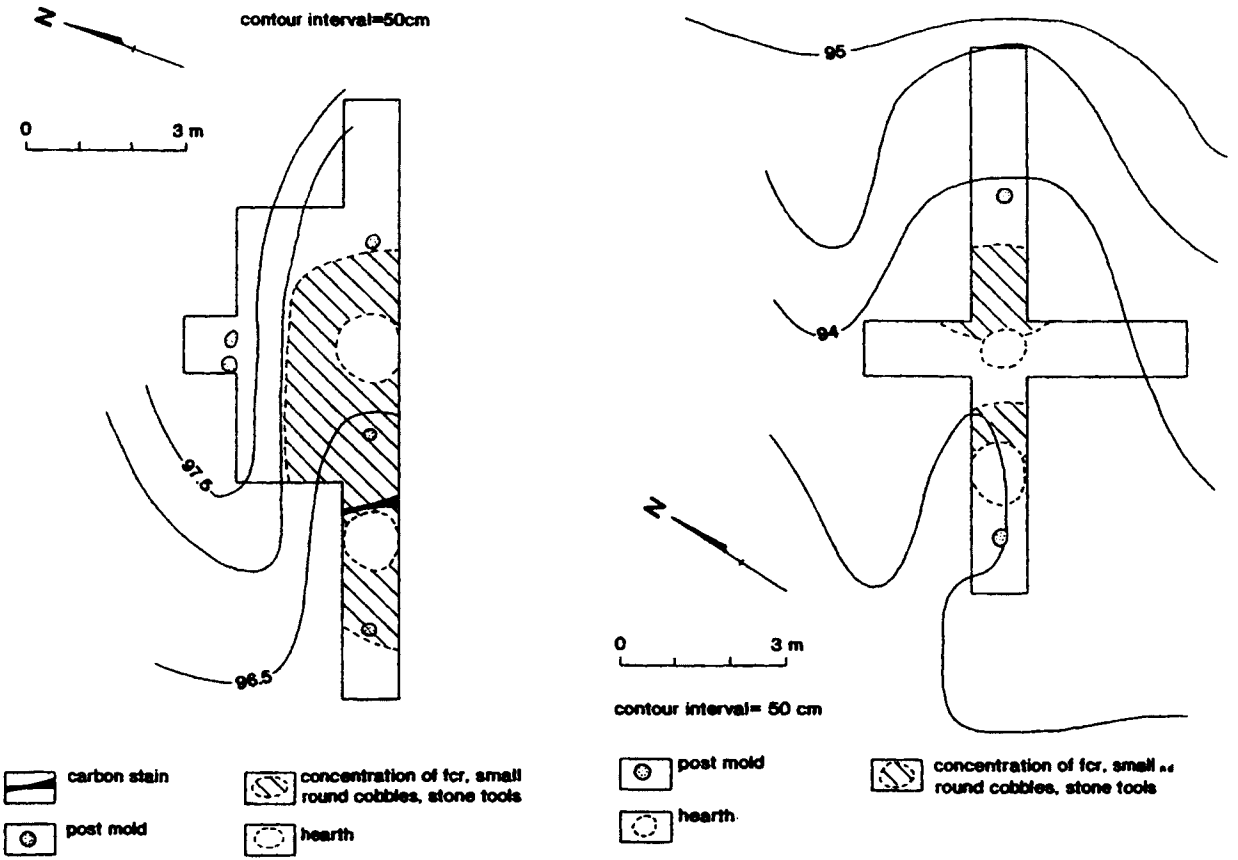


FIGURE 6-13 Excavation in Paul Mason component houses 2 and 9, showing features on the house floors. Note the two hearths present on both floors. (From Coupland, 1988a.)

Dwellings at the Paul Mason site were very uniform in size. Surface measurements of the house depressions indicate that most houses were between 8 and 11 m long and 5 to 6 m wide. The smallest house has an estimated 45.8 sq. m of floor space; the largest 72.6 sq. m, a difference of only 59%. Household size, estimated on the two independent bases of floor area (Cook and Heizer, 1968) and number of hearths, was calculated to be 10 to 12 people, or about two families, for each dwelling (Coupland, 1985a, 1988a:259). This value is about half the size often given for historic north coast houses (Mitchell and Donald, 1988). The consistently small households and apparent absence of prestige-related goods are consistent with the inference of an egalitarian social organization during the Paul Mason phase (Coupland, 1988a).

Prince Rupert Harbour

Early Period II at Prince Rupert Harbour (3500–2500 BP) (MacDonald and Inglis, 1981) coincides roughly with the Paul Mason phase at Kitselas Canyon. The overall impression is of a larger base population in the Prince Rupert area during Period II, using a wider variety of locally available resources, although detailed documentation of this is lacking.

Technologically, the Period III tool assemblage of bone and antler tools, with a few ground stone tools continued in Period II, but with a number of important additions. In the ground stone industry, perforated pebble net sinkers and notched pebble net sinkers are introduced (MacDonald and Inglis, 1981:46), reflecting new fishing technologies and possibly the exploitation of new marine habitats. Additions to the bone tool industry include socketed points, unilaterally barbed harpoons with line holes, sea mammal bone rods, and bird bone whistles. Knives made from California mussel shell were also added at this time to the previously existing shell adze blades.

Beginning about 3500 BP, deep, concentrated shell middens appear at a number of sites in the Prince Rupert area. Whereas Period III middens are said to have been made up almost entirely of thin lenses of mussel shell, the Period II middens are said to contain a wide variety of shellfish including various clams, mussels, rock cockles, and whelks. Even the sea urchin is said to be well represented. Hunting of sea mammals, mainly harbor seals, continued to be important during early Period II, but there is some evidence to suggest that land mammal hunting declined (Fladmark *et al.*, 1990:233). Exactly when this decline occurred is unclear. Calvert (1968) noted at the Lachane–Co-op site a reduced frequency of land mammal remains in the Period I component relative to Period III, but her sample did not include material from Period II. Stewart (1974:25) states that sea mammal elements increase in frequency in the upper levels of the Boardwalk site (probably Period I), but she does not make specific reference to

early Period II levels. These vagaries in the timing of change in faunal abundance notwithstanding, a wide variety of food resources was used at Prince Rupert Harbour during early Period II, and this pattern continued right into the historic period. The diversity of birds, fish, mollusks, and sea and land mammals that have been reported (Calvert, 1968; Stewart, 1974, 1977; May, 1979) reflects intensive exploitation of most of the major microenvironments in the Prince Rupert Harbour area (Fladmark *et al.*, 1990:233).

Remembering the faunal collections and analyses for the Prince Rupert Harbour have many deficiencies compared with more recent excavations and analyses, it still appears that the overall subsistence strategy for the Prince Rupert Harbour lower Skeena area during early Period II shifted seasonally from a pattern of diverse exploitation of locally available resources at the coast mainly in winter and spring to one of specialized riverine exploitation of salmon in summer and fall. Seasonality studies have so far indicated year-round occupation of the harbor area (Stewart, 1977), but with the concentration on winter and spring seasons. In turn, this pattern is consistent with a seasonally shifting settlement pattern from coast to interior riverine locations, much like the ethnographic Coast Tsimshian pattern.

Queen Charlotte Islands

Evidence from elsewhere on the north coast for the time period from 3500 to 2500 BP is rather limited. On the Queen Charlotte Islands archaeological deposits from Blue Jackets Creek date to this period, and are included in the middle period of the Graham Tradition (Severs, 1974a). The earliest occupation of the Tow Hill site also belongs to this period (Fladmark *et al.*, 1990). As a consequence of Fladmark's (1975) view that the Developed Northwest Coast Pattern evolved shortly after 5000 BP, the entire Graham Tradition is lumped together so that the developments within it are not very clear. The distinctive character of the Queen Charlotte Islands' prehistory, seen most clearly in the persistent emphasis on chipped stone technologies, is maintained until 3000–2000 BP (Sutherland, 1980; Fladmark, 1989:216), after which time cultural developments become increasingly similar to those seen on the mainland, no doubt a result of increased island–mainland interaction.

Overall increases occur in the proportions of both ground stone and bone and antler industries on the Queen Charlotte Islands. On a more specific level, zoomorphic club fragments and ribbed stones from Blue Jackets Creek are similar to those found in contemporary deposits at Prince Rupert Harbour. The latter artifact forms probably reflect the establishment of trading networks across Hecate Strait (Figure 6-9) beginning about 3000 BP, whereas the presence of mainland obsidian on the Queen Char-

lotte Islands at this time (R. Carlson, 1984) is almost certainly indicative of trade. Subsistence strategies on the Queen Charlotte Islands are also said to parallel changes seen at Prince Rupert Harbour during early Period II, with a shift toward greater emphasis on pelagic and littoral marine resources (P. Sutherland, 1980).

Mature stands of western red cedar probably did not occur on the Queen Charlotte Islands until about 3000 BP (Hebda and Mathewes, 1984). P. Sutherland (1980) argues for the emergence of a north coast interaction sphere at this time. She suggests that mature stands of cedar may have been required to build canoes large enough to make the dangerous crossing of Hecate Strait to the mainland (Fladmark *et al.*, 1990:237).

Southeastern Alaska

In southeastern Alaska a number of site components have yielded radiocarbon dates ranging between 3500 and 2500 BP. Component III at Hidden Falls has an early radiocarbon date of 3015 ± 55 (SI-3974) BP, another date of 2255 ± 90 (SI-4506) BP, and a cluster of nine late dates ranging from 1755 ± 70 (SI-4512) to 1315 ± 105 (SI-4508) BP (Davis, 1989:337). According to Davis, initial occupation associated with Component III began at about 3000 BP and lasted until about 2500 BP, at which time the site was abandoned. Several ephemeral occupations followed between 2300 and 1300 BP.

The artifact inventory includes many of the forms found in Component II, as well as new forms such as unilaterally barbed bone points without line guards or holes, small planing adzes, bone tubes, and drilled mammal teeth (Davis, 1989:200). Ground stone tools account for 33.7% of the tool assemblage (Davis, 1989:309), about 12% less than in Component II. Bone and shell artifacts made up 11.0% of the assemblage.

Numerous hearth areas, postholes, a bark mat, and a fragment of a wooden pole, all of which suggest the building of wooden structures, are reported (Davis, 1989:320–329). Component III deposits also contained concentrated shellfish remains, which ensured faunal preservation. Fish remains were most abundant, representing 71.9% of the assemblage, as measured by bone weight (Moss, 1989a:101). Land mammal elements accounted for 12.4%, with sea mammal remains at 10.1%. Moss (1989a:107) has calculated usable meat weights for the most frequently occurring taxa, based on estimates of minimum number of individuals as detailed in the sidebar. Salmon were the most important identified fish remains, with Pacific cod being second.

> According to Moss's live weight calculations, salmon was the most important food resource, by far, with an estimated meat weight of 178.4 kg. Pacific cod (*Gadus macrocephalus*) was next most important at 93.7 kg. All

other identified fish yielded a combined usable meat weight of 44.8 kg. Seal, at 58.7 kg, and sea otter, at 25.4 kg, were the main sea mammal resources, whereas deer, at 22.5 kg, was the most important land mammal. Perhaps the surprise in this list of resources is the Pacific cod, which is not commonly thought of as an important traditional food resource on the Northwest Coast, although Croes (1992b) reports it as one of the most common fish in contemporaneous deposits at Hoko River. Its abundance at Hidden Falls III may be a reflection of the variability in food procurement patterns that existed in different geographical areas along the coast during the late prehistoric and early historic periods.

Pacific cod also gives some evidence of seasonality. During much of the year this bottom-fish lives in deep open water, but migrates into shallow water in early spring (Hart, 1973:223). Moss (1989a:107) suggests that its abundance at Hidden Falls III suggests a spring occupation, beginning as early as March. Continued summer occupation cannot be ruled out, because these cod remain in shallow water usually until early autumn (Hart, 1973:223). Salmon elements at Hidden Falls III were represented almost entirely by vertebrae, which, as presented in an earlier sidebar, indicates storage and supports the proposal of a spring occupation. The gathering of shellfish, the remains of which are abundant in Component III, is also thought to have been primarily a late winter or early spring activity, at least among the historic Tlingit (Oberg, 1973:74; Erlandson, 1989:157).

Analysis of the shellfish remains at Hidden Falls III (Erlandson, 1989) indicates that bay mussel was the most abundant taxon, accounting for 53.6% of all shell by weight (1989:142). Littleneck clams, butter clams, and the Sitka periwinkle (*Littorina sitkana*) were also numerous. Although yields are difficult to quantify and compare to vertebrate species, Erlandson (1989:153) argues that shellfish may have contributed as much or more usable meat than fish. Without question, shellfish were an important food resource during the time of Hidden Falls III, whereas they were clearly less utilized during the earlier time periods. Although mussels predominated generally at Hidden Falls III, the relative importance of clams appears to have increased steadily through time (Erlandson, 1989:155). This trend has been noted elsewhere on the west coast, as described earlier for Crescent Beach and more generally by Botkin (1980).

Hidden Falls III provides an important example of the seasonal organization of subsistence activities during this stage on the north coast. Best interpreted as a spring fishing camp, the occupants of the site engaged in shellfish gathering, cod fishing, and mammal hunting to a limited extent. Salmon was apparently not caught at this site, is represented only by vertebrae, and was certainly not a spring resource. Yet it was still the primary food resource at Hidden Falls III, demonstrating its overwhelming importance in north coast subsistence economies in this stage.

Evidence of intensive fish procurement by 3000 BP comes from three other sites in southeastern Alaska. Fish weirs at Favorite Bay near Angoon on Admiralty Island—by far the best documented—Exchange Cove on

Prince of Wales Island, and Cosmos Cove on Baranof Island (Moss *et al.*, 1989, 1990; Moss 1989b) indicate mass harvesting of salmon from this early time period. The use of weirs in this area for at least 3000 years has profound implications for the prehistoric economy of the north coast. Moss *et al.* (1990) and Matson (1992) argue that the presence of weirs adjacent to known salmon streams is evidence of large-scale salmon use and storage. Weir construction for short-lived runs is only economically feasible if storage technology was present; otherwise the large numbers of fish would rot. Construction and maintenance of weirs represents a significant investment of organized labor. The return on this investment on salmon streams is large catches of fish, which require efficient techniques of processing and storage. In addition, weirs are fixed resource extraction facilities, which implies that the people who build and maintain them also control them and the resources caught in them, as Richardson (1982) demonstrates for ethnographic Northwest Coast cultures. The evidence indicates that by 3000 BP economic changes had occurred over much of the north coast that resulted in an economy similar in many ways to that seen among ethnographic Northwest Coast peoples and that fits the Croes and Hackenberger (1988) storage model.

Central Coast of British Columbia

In contrast to other areas of the north coast, there is evidence of economic decline after 3500 BP at Namu on the central coast of British Columbia. Period 5 deposits at Namu have eleven radiocarbon dates ranging from 3500 ± 100 (SFU 19) to 2185 ± 85 (WSU 1939) BP (Carlson, 1991a, p. 93). Averaging all 11 dates does not give a more exact date, because we are dealing with a long period, but does give a "center of gravity" in this case of 2856 ± 29 BP. Important changes occur in the faunal assemblage during this period (Cannon, 1991:39–40). There is a general increase in shellfish volume. Mussels decline, but there is a major increase in clams, a pattern similar to that seen at Hidden Falls III. The steady increase in clams at Namu was probably due to a rise in sea level of approximately 3 m on this part of the coast after 3500 BP (Andrews and Retherford, 1978:348). This rise may have resulted in increased sedimentation at the mouth of the Namu River, expanding the habitat for burrowing clams. The sea-level rise, however, may have had a disastrous effect on other resources. Most importantly, salmon declined from their Period 4 peak of 94% of all identified vertebrate remains to 80%. Cannon (1991:39) argues that this decline is so great that it can only be accounted for by an almost total collapse of the Namu River run. Other resources, previously important at Namu, also declined in Period 5. Herring dropped from Period 4 levels of 0.6% to 0.4%, and harbor seal, from 0.8% to 0.2%. Some resources, however, actually increased in their proportion in Period 5, including ratfish (*Hydrolagus*

colliei) from 0.1% in Period 4 to 2.1%, and rockfish from 1.2% to 6.8% and even deer from 0.8% to 2.0%. The overall trend, according to Cannon (1991:40), was that major resources declined precipitously during Period 5 at Namu and never did recover. Although this decline was partly compensated for by increases in some minor fish taxa and clams, economic activity and intensity of site use diminished at Namu after 3500 BP.

The dominant bone industry found in this period does not significantly change from the previous periods reported in this chapter. It is interesting that the artifacts do not show much change in light of what are interpreted as major changes in the faunal remains. To be sure, the extent of these faunal changes are measured on a method of standardizing the abundance of salmon remains, rather than the percent of fauna reported here. Cannon (1991:33) does report that his standardization method "may exaggerate differences between periods."

Summary of the North Coast

The most important development on the north coast during this period is the establishment of a village of large, rectangular houses at the Paul Mason site at Kitselas Canyon. This site was probably occupied in the winter and based on intensive salmon processing and storage. Despite impressive similarities with ethnographic Northwest Coast villages in terms of layout, there is no evidence of hereditary social inequality there.

Intensive fish procurement that was almost undoubtedly salmon is clearly demonstrated at the Favorite Bay fish weir and related sites in southeastern Alaska, whereas Hidden Falls III provides evidence of salmon storage. The growing importance of salmon during this period may also be indicated, albeit in a negative way, at Namu, where the possible collapse of the Namu River salmon run may have led to a sharp economic decline.

At Prince Rupert Harbour, an expanding population is inferred from the growing number and size of site components, and a diverse array of locally available food resources that were taken. Existing data, however, are not of the quality to permit an evaluation of the possibilities of intensive salmon procurement and storage, or of permanent winter villages. Because evidence for Croes and Hackenberger's storage economy is found up and down the coast at this time, we believe that future research will reveal its presence at Prince Rupert Harbour. We are divided on the issue of whether future research will discover Paul Mason-type villages at this time at Prince Rupert Harbour, but believe other examples of this phenomenon will be found elsewhere.

On the Queen Charlotte Islands, increasing similarities with mainland components are said to begin about 3000 BP indicating the emergence of a north coast interaction sphere based on long-distance trade and complex redistribution. Both of these are important features of the Developed

Northwest Coast Pattern and may be partly dependent on the availability of large cedar trees.

CHAPTER SUMMARY

In some ways the period from 3500 to 2500 BP is the most exciting of all on the Northwest Coast. Earlier periods have little in common with the Developed Northwest Coast Pattern, and, in general, appear to be little more than coastal Archaic adaptations. This period, on the other hand, has a number of important technological and economic traits commonly associated with the Developed Northwest Coast Pattern.

The full range of technology is evinced for the first time, including bone, antler, chipped stone, and ground stone. Chipped stone continues to dominate most assemblages, which is in contrast to later periods. On the other hand, the relative amount of chipped stone in this period diminishes from earlier periods. Of particular importance is the introduction of ground slate knives, which may relate to large-scale fish processing (Hayden, 1989). The earliest known weirs were also built adjacent to salmon streams (Moss *et al.*, 1989, 1990; Moss, 1989b), indicating that intensive procurement technology was present along with the processing technology.

The first abundant evidence of large-scale woodworking occurs during this period, with ground stone adzes found in both central and north coast assemblages. The presence of large, rectangular multifamily houses, laid out in two rows, is attested to at the Paul Mason site. The range of decorated bone, antler, and ground stone items found from the Gulf of Georgia to the Alaskan Panhandle demonstrates that the techniques to work these materials were also well developed and widely practiced.

The main economic development during this stage was the widespread use of extensive fish storage, which may have raised the carrying capacity in many areas by a factor of six (Croes and Hackenberger, 1988). Storage of salmon is clearly demonstrated in the Locarno Beach phase component at Crescent Beach, in Hidden Falls III, and, indirectly, in the Paul Mason phase component at the Paul Mason site, as well as less certainly at a number of other locations. The increase in number of seasonal limited-activity sites on the central coast may also reflect the increasing importance of storage during the Locarno Beach phase. Buckley Bay, Hoko River, Crescent Beach, Bowker Creek, and even the Locarno Beach site itself, all have seasonal limited-activity components. This pattern of seasonally limited nonbase camps is in contrast with the previous stage, where almost all sites appeared to be base camps occupied at varying seasons throughout the year. Limited-activity sites for processing and collecting resources, in this case the most important would be the salmon procuring and processing sites, are the essential characteristic of the "collector" strategy (Binford,

1980). Thus, multiple lines of evidence indicate that an economy based on stored salmon, complete with specialized seasonal camps, was fully developed during this period. As to the original idea that Locarno Beach period cultures were based on sea mammal hunting, little evidence can be cited in support.

Although the Locarno Beach culture has been recognized for more than 40 years, and several dozen components have been excavated (Mitchell [1990] claims 29 known components, our Table 6-1 lists 28 excavated and described probable Locarno Beach components), the only definite domestic structures recorded are the rather small winter pithouse at Crescent Beach and the inferred seasonal mat-lodge at Hoko River (Howes, 1982). The Developed Northwest Coast Pattern village, then, has not been located in the Locarno Beach culture. We are divided as to whether villages with large rectangular houses will be located at this time in the Gulf of Georgia, with Matson believing that given the number of sites excavated, villages are not likely to be present. Furthermore, in spite of the presence of labrets, historic status markers on the north coast, convincing evidence of inherited status differentials is lacking. So Locarno Beach, in spite of a Northwest Coast Pattern technology and economy, falls short of the Developed Northwest Coast Pattern.

The main cultural feature of the Developed Northwest Coast Pattern that is missing from the period between 3500 and 2500 BP is ascriptive social inequality. Evidence from burials, and comparative evidence from households at the Paul Mason site are consistent with an egalitarian form of social organization. No site from this time period on the Northwest Coast has all of the elements of the Developed Northwest Coast Pattern, with at least one key element being absent from each site. In Chapter 7, we will examine a number of sites in which all elements are present.

7

The Achievement of Cultural Complexity

* * *

INTRODUCTION

The Developed Northwest Coast Pattern was fully achieved in a variety of places along the Northwest Coast in the period from 2500 to 1400 years ago. In some ways this period appears to be the peak of complexity, with artistic achievements not matched in later archaeological cultures, and good evidence of pronounced ascribed status differences. This stage, like so many others, was both first described and is best known from the Gulf of Georgia area where it is manifested as the Marpole phase. Despite widespread and long-established agreement that Marpole culture had reached the Developed Northwest Coast Pattern, the grounds for this inference were weak until the late 1980s.

HISTORY OF THE MARPOLE CULTURE

The Marpole culture is named after a region of south Vancouver where the Great Eburne midden, now called the Marpole site, is located (Figure 7-1). This site was first investigated by Hill-Tout (1895, 1948) and H. I. Smith (1903). Charles Borden (1950, 1951) recognized the material described by Smith to be similar to the material Borden had excavated at the Point Grey site in 1946. Borden concluded that this Marpole culture must date after the Locarno Beach culture, but prior to the culture that he later named Stselax. Marpole, then, was the second of the three widely recognized phases that Borden set up for the first generally accepted cultural sequence along the Northwest Coast, often referred to as the Fraser delta sequence (Gaston, 1975).

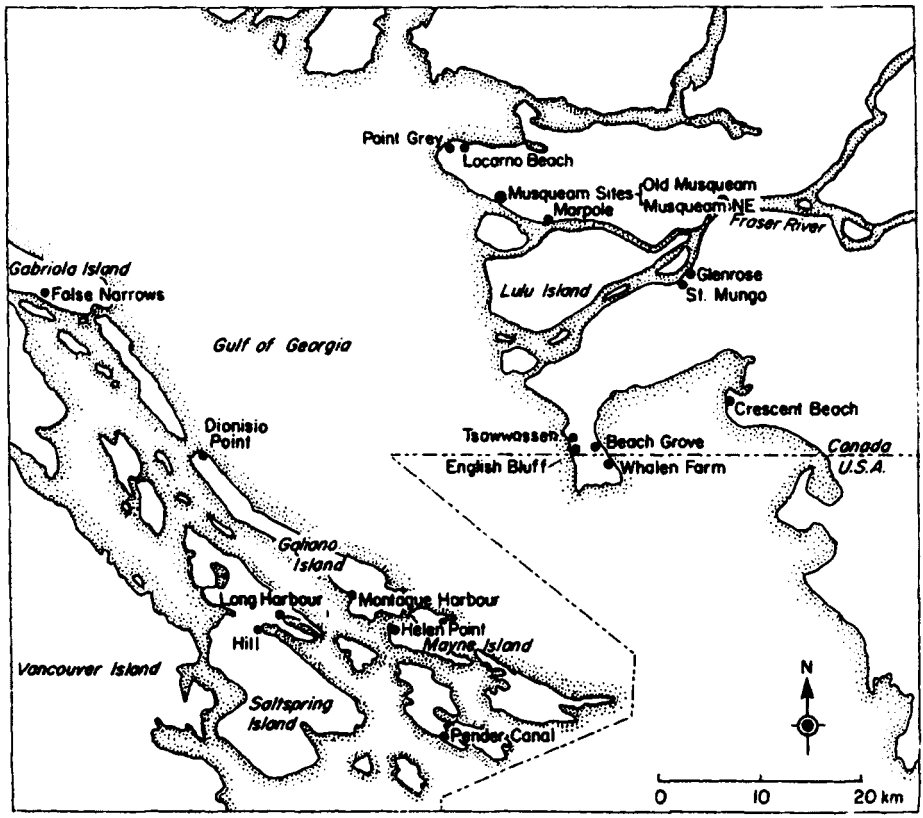


FIGURE 7-1 Sites with Marpole components, Gulf of Georgia.

Although Borden did publish preliminary reports with considerable descriptive information (Borden, 1950, 1951) and a relatively complete trait list (Borden, 1970), he never produced complete site reports, which led some to doubt the validity of his Fraser delta sequence (e.g., Abbott, 1972). Roy Carlson (1954, 1960) produced the first useful descriptions of Marpole components. His work in the San Juan Islands, in the southern Gulf of Georgia, partially replaced King's (1950) cultural sequence, which was never really accepted by others working in this region. R. Carlson's synthesis supported the last two-thirds of the Fraser delta sequence and contained the first complete, although brief, descriptions of Gulf of Georgia components.

Mitchell's monograph (1971b) on the Montague Harbour site included a summary and validation of the Fraser delta sequence, as well as a description of the Marpole component there. He confirmed the dating of this culture as following Locarno Beach, beginning at about 2400 BP and lasting at least until 1400 BP. This verification of the three-part Fraser delta sequence was corroborated by Matson's (1974) cluster analysis and multidimensional scaling of a series of sites, which also included the first artifact tabulations of some briefly reported components.

The next step in our understanding of the Marpole culture resulted from Burley's (1979b, 1980) monograph, which incorporated the information from a number of descriptive reports on Marpole phase components that became available around this time (as listed in Table 7-1). Burley (1979b, 1989) also added his own descriptions of previously unanalyzed Marpole components from the False Narrows site and the Marpole site itself. He used this data set as the basis for a variety of analyses and a synthesis of the Marpole phase (Burley, 1979b, 1980). Burley's most important analyses took Matson's (1974) approach as a starting point, and used multidimensional scaling as the main technique. Matson (Matson *et al.*, 1980; Matson, 1989) reanalyzed this data set, incorporating some minor additions and using slightly different techniques, and confirmed Burley's major conclusions and added further insights about Marpole interassemblage variability. Burley's study resulted in the first complete monograph-length synthesis of any prehistoric culture on the Northwest Coast, and will undoubtedly be used as a model for others yet to come.

The Marpole Phase

In his synthesis, Mitchell (1971b) lists 20 "distinctive" archaeological features of the Marpole culture (which are repeated in Burley, 1980). The most important of these are the occurrence of ground slate knives and points, celts, labrets, hand mauls, perforated stones, large needles, unilaterally barbed antler harpoons (Marpole "style"), fixed unilaterally barbed

TABLE 7-1 Excavated Marpole Components

Site*	Reference
Montague Harbour II*	Mitchell, 1971b
Helen Point II*	J. McMurdo, 1974
Cadboro Bay I*	Mitchell, 1968a
False Narrows*	Burley, 1989
Marpole*	Burley, 1979b; H. Smith, 1903; Borden, 1970
Old Musqueam (DhRt 3)*	Monks, 1976
Beach Grove*	Borden, 1970; Matson *et al.*, 1980
Point Grey*	Matson, 1974; Coupland, 1991
Garrison*	Carlson, 1960; Kornbacher, 1989
Richardson*	Carlson, 1960
Cattle Point*	Carlson, 1960
North Saanich*	H. Smith, 1907
Deep Bay**	Monks, 1977, 1987
Shoemaker Bay I**	McMillan and St. Claire, 1982
Musqueam NE (DhRt 4)**	Matson, 1974
Glenrose Cannery**	Matson, 1976
Port Hammond**	H. Smith, 1907
Sumas (45 WH 5)**	Grabert and Larson, 1975
Crescent Beach**	Percy, 1974; Matson *et al.*, 1991
English Bluff**	E. Sutherland, n.d.
Whalen Farm**	Seymour, 1976; Thom, 1992a
Birch Bay**	Gaston, 1975
Cherry Point**	Gaston, 1975
Nooksack (45 WH 34)**	Grabert and Larsen, 1975
Bellingham Bay**	Burley, 1980
Hill Site**	Hall and Haggarty, 1981
Birds Eye Cove**	Wilmeth, 1978; Burley, 1980
Dionisio Point**	Mitchell, 1971a
Argyle Lagoon**	R. Carlson, 1960
Maple Bank**	A. McMurdo, 1976
Fox Cove**	Kidd, 1969
Locarno Beach	Borden, 1950, pers. comm.
Tsawwassen	Arcas, 1991b
Water Hazard Site	Bernick, 1989
Long Harbor	Johnstone, 1991
Biederbost	Nordquist, 1976
St. Mungo	Calvert, 1970; Boehm, 1973
Liquid Air	Sneed, 1970
Pender Canal	Hanson, 1990; R. Carlson, 1986, 1990c
Duke Point (DgRx 5)	Murray, 1982

*, components listed in Mitchell, 1971b: **additional components listed in Burley, 1980.

antler points, and stone and antler sculpture (Figure 7-2). Equally distinctive is the Marpole near absence of composite toggling harpoon valves found in the preceding Locarno Beach phase. Carved and decorated objects are relatively abundant (Figure 7-3), and show continuity with historic Salish art (Holm 1990) as shown in the sidebar. Copper objects are found for the first time, sometimes with burials.

Although the beginning of the Marpole phase is securely dated to 2400 BP, the termination is less certain, with reported dates ranging from 1500 to 1100 BP (Mitchell, 1971b; Burley, 1980:32; Matson *et al.*, 1980). Although Burley reports over 30 Marpole radiocarbon dates as of 1979, and Matson and Coupland alone have run another dozen since then, the ending of this culture is still not securely dated. Later in this chapter we will explain why this ambiguity remains, despite over 60 available dates.

Mitchell (1990) states that only 33 Marpole components were known to him, in comparison with 29 for the Locarno Beach phase (without listing either). Our tabulation (Table 7-1) shows 40 sites with Marpole components compared with 28 Locarno components listed in Chapter 6 (Table 6-1). This definite increase is not as impressive as that seen in the Gulf of Georgia between the previous two cultures (St. Mungo–Mayne vs. Locarno Beach). In any event, there is a large number of known Marpole components, some of which are truly large, such as the Marpole site itself and Beach Grove (Figure 7-4A).

The Marpole culture includes numerous art objects making it possible to ask questions about associations and meanings, and how Marpole art compares with other Northwest Coast art, both prehistoric and ethnographic. Fortunately, Margaret Holm (1990) has produced a valuable study of Gulf of Georgia prehistoric anthropomorphic and zoomorphic artifacts, examining a total of 242 such items from 54 sites. The majority of dated objects, 72, came from Marpole contexts.

Margaret Holm (not to be confused with the well-known authority on ethnographic Northwest Coast art, Bill Holm) found that three anthropomorphic and zoomorphic motifs dominated the Marpole collections (Figure 7-3): bird forms, people (who may represent supernatural beings), and lightning snakes, which are depicted with small feet and feathered heads. All of these forms are found in ethnographic art, with the lightning snake having some similarities with the feathered serpent of Mesoamerica. Seated human figurine bowls are a well-known example of the Marpole anthropomorphic art, and Holm reports that human faces were frequently found on pendants (Figure 7-3A–D), bird shapes on toggles or pendants, and elongated zoomorphic creatures that may represent lightning snakes on harpoon points (Figure 7-3E–H) and atlatl equipment. Two whale bone clubs were recovered from the Marpole site and one was decorated with a bird design. In general, Holm finds Marpole art highly standardized.

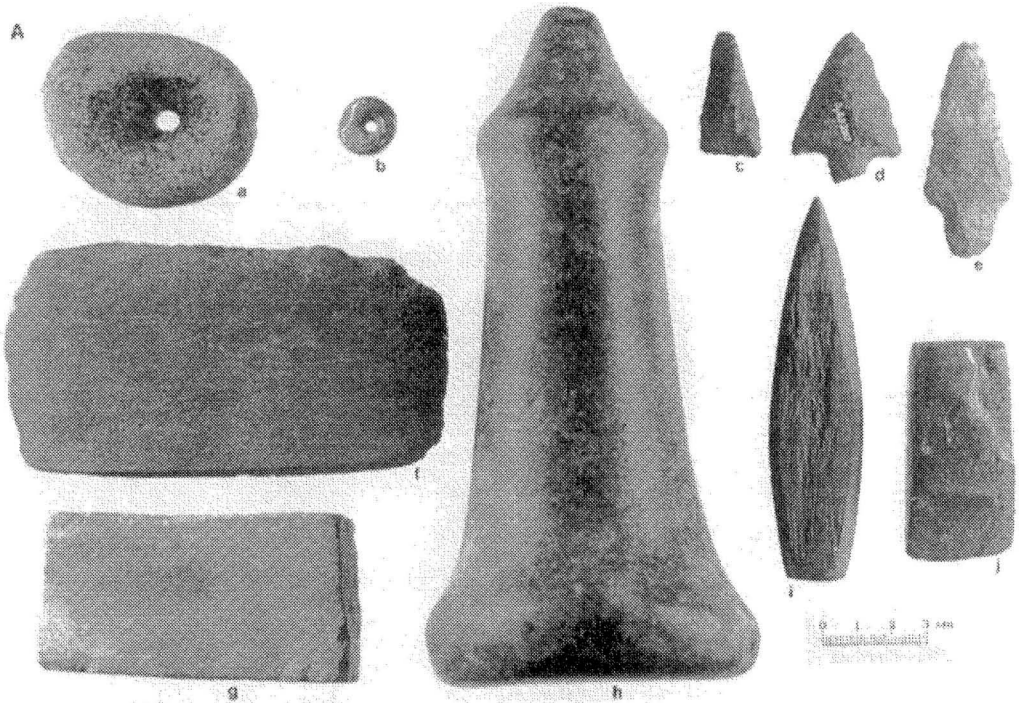


FIGURE 7-2A Marpole artifacts. (a) Biconical drilled stone; (b) nephrite bead; (c) triangular chipped stone point; (d, e) stemmed points; (f) ground slate knife; (g) shaped abrasive stone point; (h) nipple topped maul; (i) ground slate point; (j) nephrite adze blade.

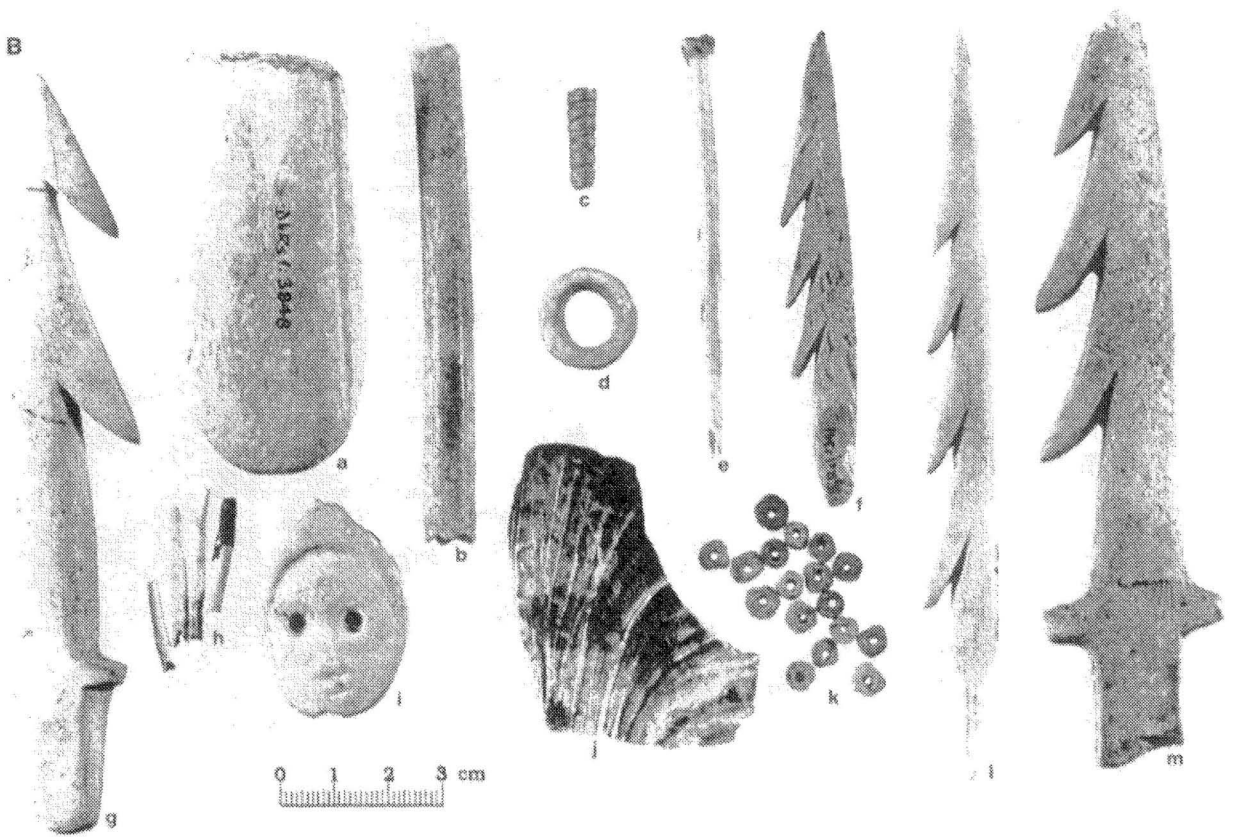


FIGURE 7-28 (*Continued*). (a) Antler wedge; (b) bird bone tube; (c) decorated antler; (d) bone ring; (e) bird bone awl; (f, l) antler fixed, barbed points; (g, m) Marpole-style harpoons; (h) dentalia beads; (i) anthropomorphic antler art; (j) mussel shell tool; (k) ground shale beads. (From Borden, 1970.)

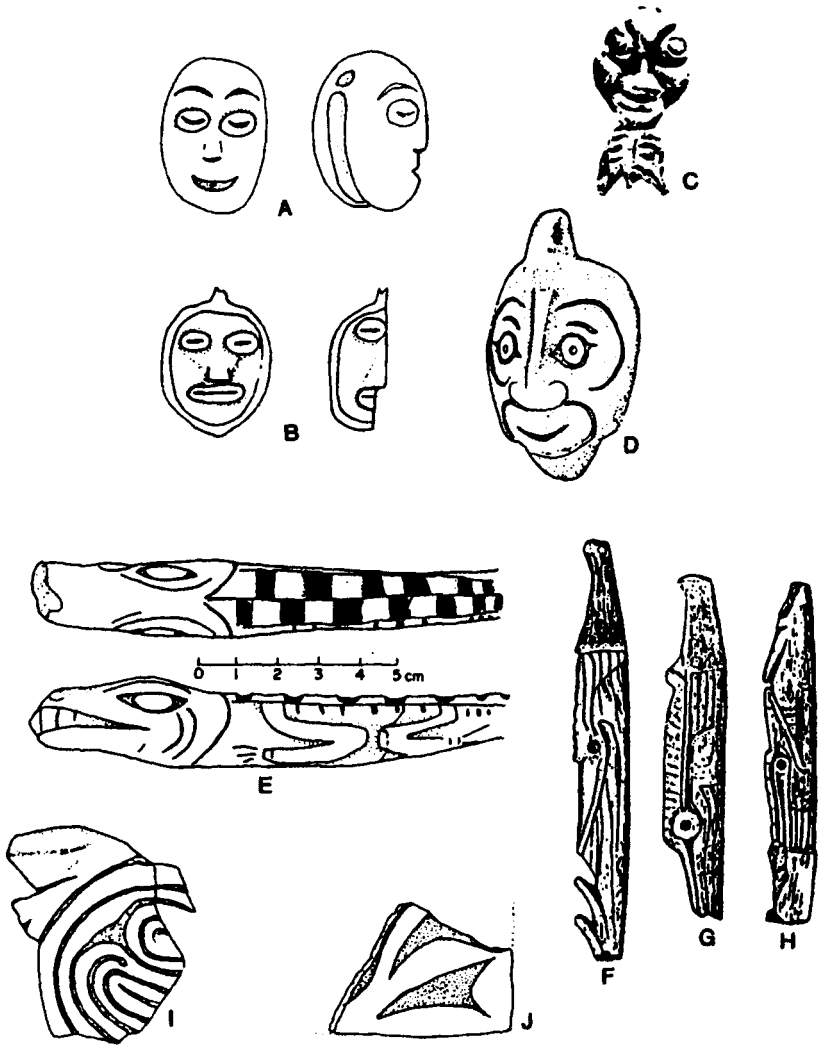


FIGURE 7-3 Marpole art. (A–D) Anthropomorhpic heads; (E–H) lightning snakes on harpoons; (I, J) engraved T and wedge-shaped formlines. (From Holm, 1990.)

Many of the stylistic elements found in ethnographic art are seen on Marpole objects. These include T-shapes and engraved wedge-shapes based on formlines that become very important in later art (Figure 7-3I,J). In general, the design style is "based on engraving where negative space is carved out to create a raised positive design" (Holm, 1990:320) and is present by early Marpole times. Holm rightly argues that these features of Marpole art show continuity with ethnographic art of the same region, in

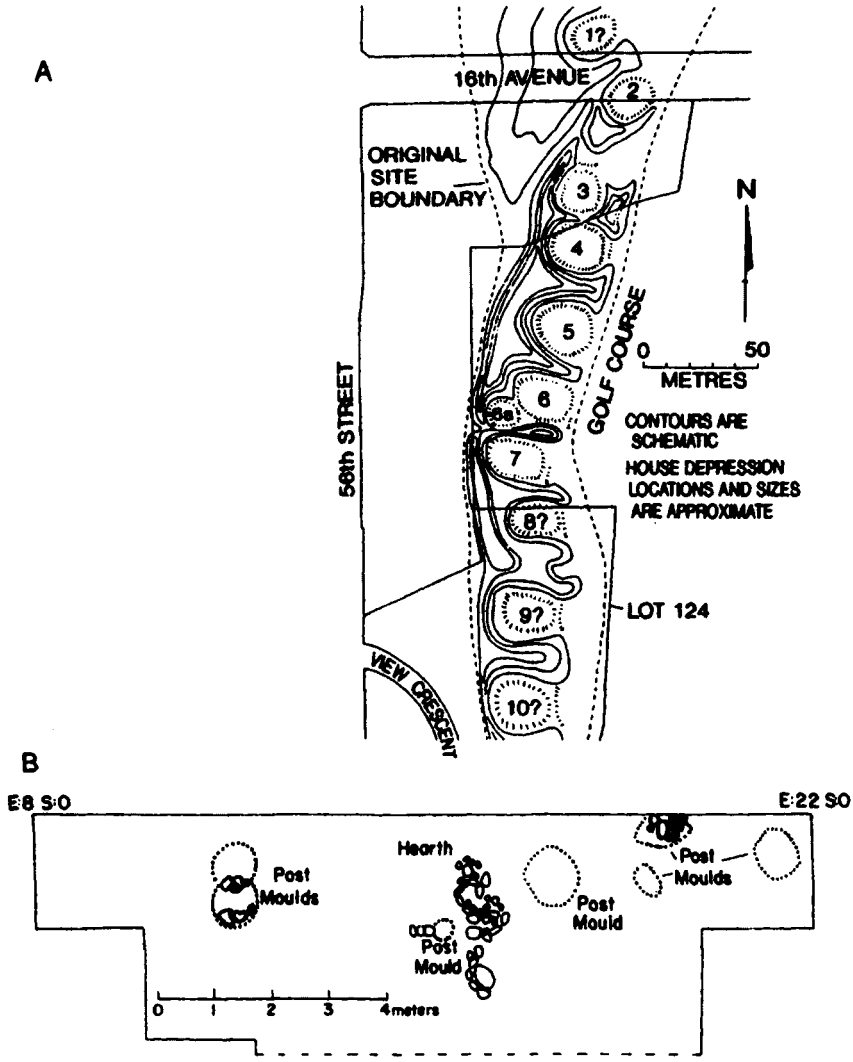


FIGURE 7-4 Marpole phase house structures. (A) Beach Grove house platforms (Ham, 1980). (B) Shoemaker Bay postmolds (McMillan and St. Claire, 1982)

contrast with many earlier studies. Many of these attributes demonstrating continuity can be seen to have antecedents in Locarno Beach art, and even to some degree, in the rare St. Mungo art objects.

Holm also argues that the contrast between the north and central coast ethnographic art is overemphasized. In ethnographic Coast Salish art there are two different carving styles: elaborate two-dimensional engraving and rather unembellished three-dimensional sculptures. In

contrast, Marpole and north coast art examples often combine engraving with formlines, and design elements with three-dimensional sculpture. In the north, formlines are often defined through painting, whereas Coast Salish art has continued the interest in pure engraving from Marpole times.

Holm finds some support for R. Carlson's (1983b) hypothesis that some objects may represent guardian spirits, but little support for MacDonald's idea (1983a) that these objects act as corporate markers. Instead she proposes that the widespread use of highly standardized themes and decorated forms signals power across cultures, similar to the way Chilkat blankets and raven rattles did historically. Holm also hypothesizes that a recognizable style of carving, the deeply engraved, finely finished mode, in association with certain motifs, such as the lightning snake, may "signal the special status of the owner" (Holm, 1990:332).

Thus, Holm finds prehistoric Northwest Coast art from the Gulf of Georgia to be intimately connected with historic Northwest Coast art from both the north and central coasts. A number of previous ideas about the nature of prehistoric Northwest Coast art in general and Marpole art in particular are not supported. It is clear, though, that Marpole is the "florescence" of prehistoric Northwest Coast art, at least in antler and stone, as shown by the 72 recorded Marpole objects, in contrast with only 7 objects from later in the Gulf of Georgia. Holm believes that this rich sample of Marpole art is largely the result of abundant burial inclusions, discussed elsewhere in this chapter. In art, then, as in other areas, the Marpole culture is clearly a part of the Developed Northwest Coast Pattern.

House outlines are present at a minimum of five sites, Garrison, (Kornbacher, 1989), Beach Grove, (Matson, 1980), False Narrows (Burley, 1989), Whalen Farm (H. Smith, 1921), and Dionisio Point (Mitchell, 1971a), with Tualdad Altu (Chatters, 1989) a likely sixth. Very large postmolds (up to 1.0 m in diameter), almost surely from plank house frames, are found at the Marpole site itself (Borden, 1970) and at Shoemaker Bay (McMillan and St. Claire, 1992), whereas a series of postholes interpreted as a back wall of a house are found at Long Harbour in layer 4, which is probably of early Marpole age (Johnstone, 1991).

According to Ham (1980) Beach Grove had 10 visible house platforms at the turn of the century; H. I. Smith's 1921 sketch map actually shows 12 at Whalen Farm. The Beach Grove site house platforms, as Figure 7-4A shows, are surrounded by large U-shaped shell heaps up to 5 m in height. Given that the shell heaps are assumed to be the result of refuse dumped in back of permanent house frames, we can estimate that the minimum house size was 10 × 13 m, although no one has actually found the boundaries of these houses. Since the portion of the Beach Grove site with house platforms is a single component Marpole site (Matson *et al.*, 1980), we have good evidence for both large, multifamily households, and large villages of planked houses. The evidence from the other five sites is not as convincing,

but both the False Narrows and Garrison Bay sites have large house platforms attributed to the Marpole Phase. Both the Dionisio Point (Mitchell, 1971a) and Whalen Farm site house platforms may date to later components, and it is possible that the large and well-spaced Shoemaker Bay postmolds (Figure 7-4B) date to a possible Locarno Beach occupation discussed in the previous chapter. Johnstone (1991:63) assigns the undated layer 4 at Long Harbour to Locarno Beach.

The presence of large plank houses and abundant art objects have led many to assume that this period had achieved the level of cultural complexity associated with Northwest Coast ethnographic groups. This idea was first presented clearly by Mitchell (1968b, 1971b), who argued on the basis of grave inclusions with some burials that "there are suggestions that persons of very different status" (Mitchell, 1971b:54) were present. Furthermore, "there were persons with skull deformation and others lacking this feature, suggesting a difference going back to the time of infancy" (Mitchell, 1971b: 54). The skull is only plastic enough for significant skull deformation during infancy. Thus, if differences in skull deformation reflected differences in status, the statuses are ascribed, not achieved. According to Cybulski (1991), Marpole is the first Gulf of Georgia culture in which purposeful skull deformation is present.

Matson (1976:304) argued that ascribed status during the Marpole phase was present on the basis of subadult burials in cairns excavated earlier by Smith and Fowke (1901), some of which are known to date to Marpole times (Burley, 1980:28–29). These cairns were up to 6 m in diameter and 2 m in height, and the burials were often placed in large stone cists, indicating that large amounts of energy were used in their construction. In some cases, burial goods were also present (Smith and Fowke, 1901). Being so conspicuous, almost all coastal "burial mounds" were destroyed early in this century, leaving their age uncertain, but such dates as do exist (Capes, 1964) indicate a Marpole age. Recent excavations at the Scowlitz site, near Chilliwack at the inland end of the lower Fraser Valley, demonstrated late Marpole age for a burial mound (Blake *et al.*, 1993).

Burley (1980:67–68, 1989) reports an adolescent male interred with a number of "wealth" items at the False Narrows site. He also carried out an analysis (Burley, 1980:61, 1989) of burials from the False Narrows site that indicated the presence of two distinct social classes. Both features—subadult with wealth items and two classes of burials—are not expected in an egalitarian society but are in a society with ascribed status. A number of other reported burials can also be interpreted as indicating ascribed status, such as the infant burial with *Dentalia* beads reported by D. Smith (1964) at Beach Grove. Although almost all investigators since 1970—including Borden (1970:101)—believe that Marpole society included ascribed status differences, the reader will note that these beliefs were founded on relatively slim evidence.

Burley and Knusel (1989), however, in a survey of Fraser delta burials, did produce solid evidence that the burial patterns during Marpole times reflected status differences, and in particular, ascribed status (Table 7-2). Burley and Knusel analyzed the total available burial information from Gulf of Georgia sites. The large number of Marpole burials (145) and the significant number with "abundant" grave inclusions (20), including eight subadults (Table 7-2), are consistent with models of ascribed status.

In general, investigators believe the presence of significant "wealth" items, or evidence of an unusual expenditure of energy with some subadults is indicative of ascribed status (Saxe, 1971). This argument follows from the observation that in egalitarian societies, status beyond that allotted to sex and age is achieved, and subadults are not likely to have made significant achievements. Because cross-cultural studies (Binford, 1971; Saxe, 1971) demonstrate that burial conditions generally reflect the status the individual had in life, subadult burials with elaborate grave goods must signify high status—ascribed status.

The Burley and Knusel comprehensive burial analysis is far more reliable than looking at individual sites with a small number of burials, or basing inferences on insecurely dated material (Matson, 1976). The picture from burial analyses is convincing—Marpole society had ascribed statuses. All analyses are in agreement: Mitchell's head deformation argument; Matson's burial mound information; the existence of individual subadults with "wealth" or "status" items; analyses of burials from single sites (Burley, 1980, 1989), and the only really comprehensive and broad-based study by Burley and Knusel (1989). Interestingly enough, the burials Burley and Knusel (1989) analyzed from the Locarno Beach phase did not show the patterns associated with inherited inequality, indicating that ascribed status only developed with the Marpole phase.

We can now be relatively secure in the belief that the Marpole culture is a member of the Developed Northwest Coast Pattern, with large winter

TABLE 7-2 Marpole Phase Burials with Abundant Grave Inclusions[a]

Age category[b]	1	2	3	4	5	6	7	8	9	Total
Male	0	0	0	1	2	0	5	0	0	8
Female	0	0	0	0	0	1	2	0	0	3
Undetermined	0	1	2	0	2	0	1	0	3[c]	9
Total	0	1	2	1	4	1	8	0	3	20

[a]From Burley and Knusel, 1989.

[b]Age categories: (1) fetal, (2) infant, (3) child, (4) juvenile, (5) adolescent, (6) young adult, (7) adult, (8) old aunt, (9) undetermined.

[c]These are Beach Grove burials that were not aged or sexed, but based on drawings appear to be mature individuals.

villages, large houses, elaborate art, and inherited statuses such as is witnessed in the ethnographic societies at contact times. Relatively weak inferences made previously about the nature of the society have finally been supported by a substantial body of data and careful analyses.

Marpole Interassemblage Analysis

For his groundbreaking synthesis, Burley (1980) developed a 51-part classification for Marpole artifacts, based on previous classifications by Matson (1974) and Mitchell (1971b), and used this data matrix to nonmetrically scale 18 components from 16 sites (Burley, 1980). Matson *et al.*, (1980) used the same data, with a few additions and slightly different multivariate analytical techniques, to evaluate Marpole components. Although in most respects there are more similarities than differences between the analyses, Matson *et al.* (1980) were able to derive the more useful inferences from their analysis of interassemblage variability within the Marpole phase, and these analyses are the ones detailed in the sidebar.

Unlike Burley, Matson *et al.* (1980) converted the abundance of data collected by Burley to percentages before calculating city block distances. They also used metric scaling (Matson and True, 1974; Torgerson, 1958) instead of nonmetric scaling (Kruskal, 1964; Matson and True, 1974), but with the exception of how Matson *et al.* handled the Beach Grove site, the data remain the same. Figure 7-5 is the plot of the first two dimensions of the metric scaling results, which together contribute 45% of total trace or variance. Burley's first dimension is similar to the first one here. He noted that it may reflect time, because it is correlated with the amount of chipped stone, which in Figure 7-5 tends to be concentrated towards the bottom and which are known to be more abundant in older cultures. Burley (1980:49), however, also noted that his dimension was strongly correlated with component size (+0.61, Spearman rank order correlation). Dimension 1 on Figure 7-5 is not strongly correlated with component size, because only a +0.195 Spearman rank order correlation results. Furthermore, the correlation with radiocarbon dates ranges from +0.564 and +0.600, supporting the interpretation that the first dimension on Figure 7-5 is mainly chronological.

The next two dimensions, three and four, are not as important, together accounting only for 18% of trace (Figure 7-6). Burley noted that his third dimension appeared to separate island from mainland sites (1980:51–52). This aspect is clearly shown in Figure 7-6. Island components tended to have more perforated stones, bone unipoints, triangular chipped stone, and stemless ground points than mainland components. This mainland–island distinction may be the result of different resource distributions.

If the first two dimensions are a "seriation" we would expect a "horseshoe" arrangement (Kendall, 1971) and that is what we see, with the

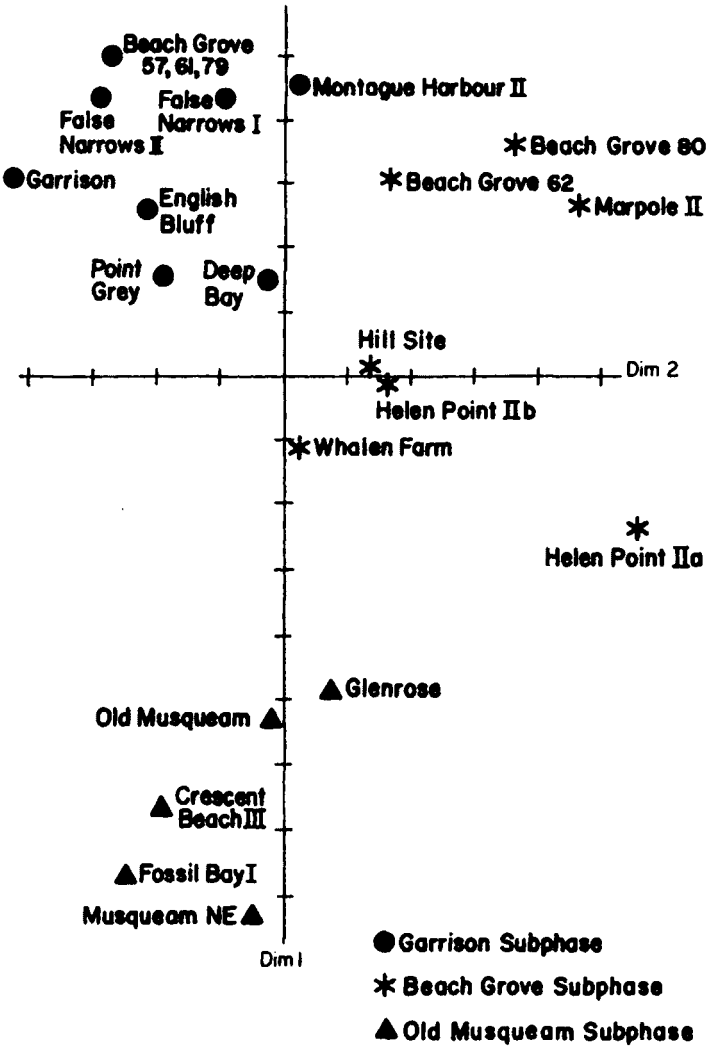


FIGURE 7-5 Metric multidimensional scaling of Marpole components, dimensions 1 and 2.

oldest sites at the bottom and the most recent sites at the upper left. We should also be able to subdivide the seriation into Marpole subphases, which is what Matson *et al.* (1980) sought. They used a Ward's cluster analysis (Anderberg, 1973; Matson and True, 1974), using only the distances from the first two dimensions, which resulted in Figure 7-7. This three-cluster solution was then interpreted as three subphases, beginning with the Old Musqueam, through the Beach Grove and ending with the one presumed most recent, named the Garrison. The summary artifact assemblages are seen in Table 7-3.

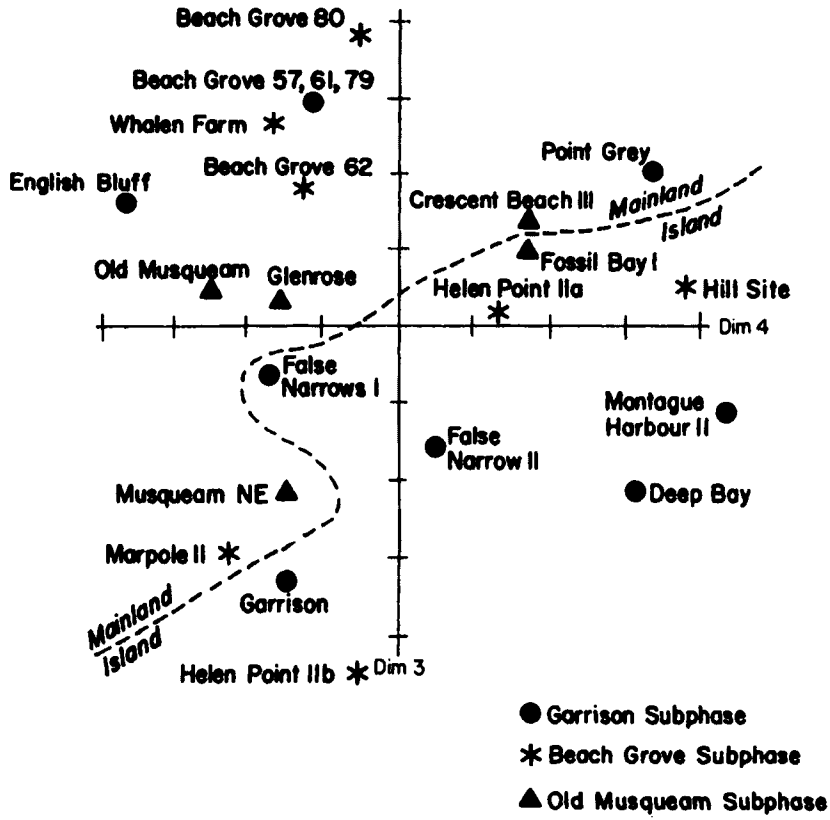


FIGURE 7-6 Metric multidimensional scaling of Marpole components, dimensions 3 and 4.

The analysis described in the sidebar results in three Marpole subphases, the oldest being the Old Musqueam, the middle, the Beach Grove, and the most recent, the Garrison subphase. The most convincing subphase is the Old Musqueam. The five components assigned to the Old Musqueam subphase are notable in two ways; all have pre-2000 BP dates, averaging 2242 BP, and four of the five are associated with the Fraser delta. Mitchell (1971b:52) noted the association of Marpole with the Fraser River, and Burley (1980:43) pointed out that the oldest radiocarbon-dated components were centered on the Fraser delta; this association is strongly supported by the locations of the Old Musqueam sites. We can be relatively certain that the first Marpole sites developed in the Fraser delta, probably based on salmon.

Another interesting feature is that three of the four occurrences of labrets in the analyzed Marpole components are found in the Old Musqueam subphase (Glenrose, Crescent Beach, and Fossil Bay) as predicted by

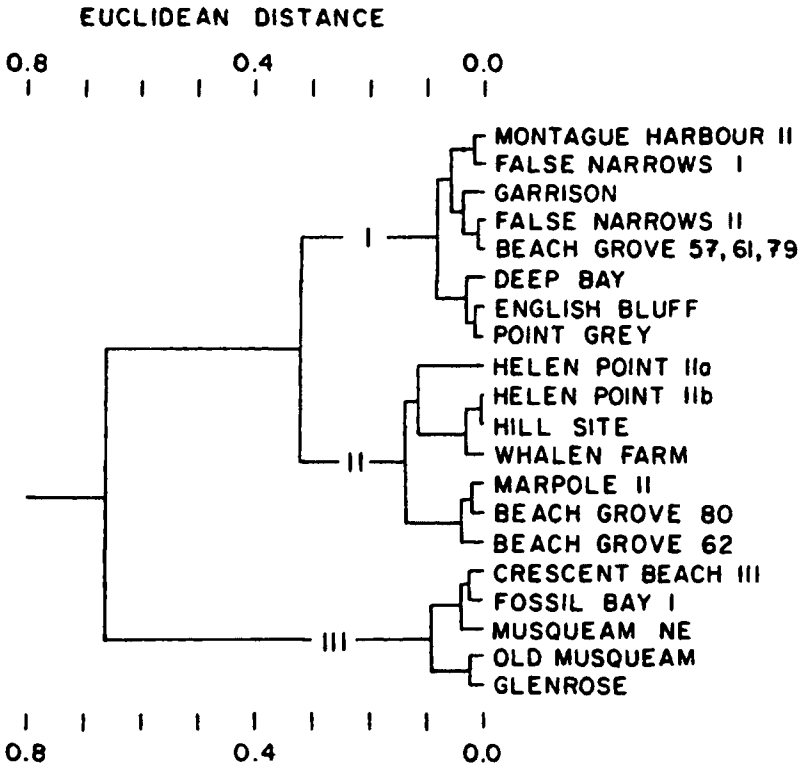


FIGURE 7-7 Ward's cluster analysis of Marpole components. Data used are dimensions 1 and 2 of multidimensional scaling (Matson *et al.*, 1980). Cluster I is the Garrison subphase, II is the Beach Grove subphase, and III is the Old Musqueam subphase.

Cybulski (1991). Of the other components analyzed, only the Hill site has labrets (6), and it is one of the least completely reported (Hall and Haggarty, 1981). Three of the labrets were found in definite association with the burials, and the other three in "probable" association (Hall and Haggarty, 1981:96). The salvage excavation of this site produced a large number of flexed burials, many under cairns, but almost all associated with bedrock, indicating that the burials are likely older than the midden associated with them. Had they been interred after the midden had been deposited, one would expect some burials to have midden layers below them rather than bedrock. Thus, many of the artifacts from the midden that were used in the analysis are likely from a later time than the burials, indicating that the association of labrets with the Old Musqueam subphase is not counterindicated. This pattern of labrets being associated with only the Old Musqueam subphase demonstrates that the use of labrets died out about 2000 years ago, which is about the time that deformed crania become common. Is this

the point where ascribed status—as opposed to achieved status—becomes dominant in this society? After all, labrets can be adopted in adulthood, but cranial deformation must be produced during infancy by one's parents.

The presence of labrets in the Old Musqueam subphase indicates continuities with the Locarno Beach phase, a finding consistent with Mitchell's position that Marpole evolved out of the earlier phase (Mitchell, 1971b:71). The observation that three of the five Old Musqueam components have microblades that are also found in the Locarno Beach phase supports this position as well. It is also interesting that no maul and only a single Marpole-style harpoon was found in these five Old Musqueam subphase components. The high percentage of chipped stone artifacts in this subphase (64% in Table 7-3) contrasts with the lower percentages in the other two subphases (31% and 21%), and is similar to Locarno Beach components.

In order to examine the relationship between Locarno Beach components and the Old Musqueam subphase, Matson (1989) used Burley's classification to categorize three Locarno Beach components and scaled them multidimensionally with the five Old Musqueam components. The first two dimensions accounted for 65% of trace and are plotted in Figure 7-8. Here the two cultures are clearly separated, with Locarno Beach at the bottom and Old Musqueam on the top, but without a large gap. Locarno Beach is distinguished from the Old Musqueam subphase by having more cobble tools, shaped abrasive stones, stone saws, hammerstones, bone chisels and wedges, and composite toggling harpoons. This analysis indicates an obvious similarity between early Marpole and Locarno Beach components, in accord with Mitchell's suggestion of an evolutionary relationship, and in opposition to Burley and Beattie's (1987) idea of a population replacement from more interior locations up the Fraser River. The differences between Locarno Beach and Marpole become more apparent when one includes the later subphases.

The now recognized similarity between the Old Musqueam subphase and the Locarno Beach phase enables us to resolve some outstanding problems, such as the nature of the Whalen Farm II component discussed in a sidebar. It is the apparent lack of understanding of the variability within the Marpole phase that led Johnstone (1991) to conclude his undated layer 4 at Long Harbour was Locarno Beach—he makes no reference to this question or any Old Musqueam component. Matson judges that the artifact profile of layer 4, which includes microblades and antler barbed points, fits well with the Old Musqueam subphase, and thus the apparent house remains fall within the Marpole phase.

As indicated earlier, it is only during the Garrison and Beach Grove subphases that mauls, unilaterally barbed fixed antler points, and Marpole-style harpoons—the last usually considered to be the fossil directeur of the Marpole phase—are regularly present (Table 7-3). In these two subphases, the amount of chipped stone was much reduced so that it becomes only a

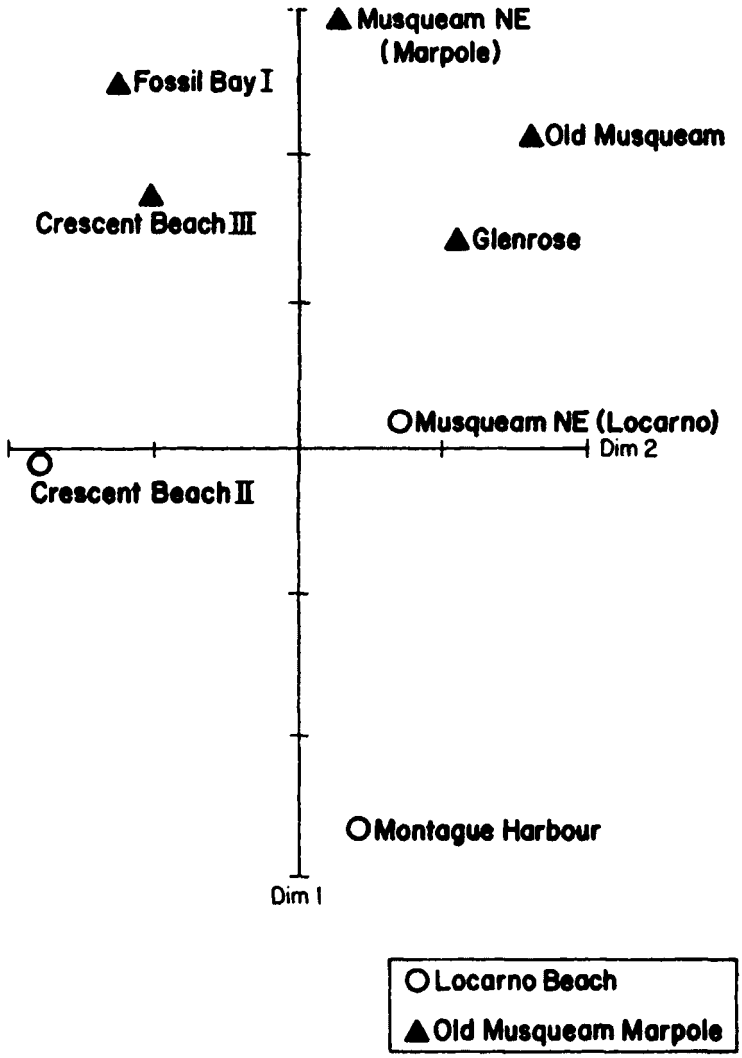


FIGURE 7-8 Metric multidimensional scaling of five Marpole, Old Musqueam subphase and three Locarno Beach components, dimensions 1 and 2 (Matson, 1989).

minor part of the Garrison subphase (mean of 21%). It is notable that the increase in ground stone, pointed, bone objects, and antler found in these two subphases presage the next phase, with bone and antler objects being most abundant in the Garrison subphase.

Although current radiocarbon dates do not clearly distinguish between the Garrison and Beach Grove subphases, the changes in artifacts and the correlation between stratigraphic relationships seen in False Narrows and

TABLE 7-3 *Artifact Content of Garrison (Cluster I), Beach Grove (Cluster II), and Old Musqueam (Cluster III) Subphases*[a]

	Mean % and range or occurrence		
	Cluster I Garrison	Cluster II Beach Grove	Cluster III Old Musqueam
Chipped stone			
Triangular points	4.5 (6/8)	2.6 (6/7)	0.2 (2/5)
Leaf-shaped points	0.9 (0–4.1)	1.8 (0.7–2.9)	2.5 (0.7–4.9)
Contracting stem points	1.5 (0.6–2.8)	1.8 (0–5.9)	1.7 (1.1–2.2)
Flake edge tools	7.3 (0–14.6)	14.9 (4.4–27.1)	44.7 (36.1–64.2)
Total	20.8 (8.7–31.7)	30.9 (15.9–43.3)	64.3 (54.3–77.9)
Ground stone			
Triangular points	0.7 (3/8)	0.1 (1/7)	0.3 (2/7)
Irregular abrasive stones	13.5 (18.8–37.8)	27.3 (7.2–19.0)	8.6 (1.7–16.1)
Decorative and decorated objects	1.3 (6/8)	0.8 (4/7)	0.4 (3/5)
Total	24.0 (15.3–32.9)	39.8 (23.2–47.5)	17.0 (10.9–28.2)
Pecked stone			
Hand mauls	0.3 (3/8)	<0.1 (1/7)	0.0 (0/5)
Perforated stone	2.3 (5/8)	0.5 (2/7)	0.5 (3/5)
Total	6.4 (0–17.8)	3.7 (0.8–7.3)	3.6 (1.7–6.6)
Bone			
Barbed bone points	1.5 (4/8)	0.7 (2/7)	0.1 (1/5)
Small unipoints	2.1 (6/8)	0.3 (1/7)	0.2 (2/5)
Bipoints	2.6 (4/8)	0.8 (3/7)	0.5 (2/5)
Bone awls	10.4 (5.7–17.0)	6.2 (0–17.6)	3.4 (1.1–5.3)
Needles	1.7 (6/8)	0.5 (3/7)	0.9 (2/5)
Chisel/wedge tools	3.4 (8/8)	1.5 (3/7)	1.6 (4/5)
Ulna awls	2.4 (7/8)	0.5 (2/7)	0.2 (2/5)
Bird bone tube	2.0 (7/8)	0.8 (5/7)	0.1 (1/5)
Unbarbed fixed bone point	0.8 (3/8)	<0.1 (1/7)	0.3 (1/5)
Total	30.2 (22.4–37.4)	16.3 (4.3–29.2)	10.7 (5.3–21.4)
Antler			
Toggle valves	1.0 (4/8)	0.5 (3/7)	0 (0/5)
Unilaterally barbed harpoons	2.0 (0–3.6)	0.5 (0–1.4)	0.1 (1/5)
Pendants	1.2 (3/8)	0.1 (1/7)	0.2 (1/5)
Barbed points	3.6 (1.4–7.9)	2.8 (0–4.9)	0.4 (0–1.7)
Total	14.6 (9.5–27.7)	8.8 (2.2–17.4)	0.2 (2/5)
Shell			
Pendant/gorget	1.7 (5/8)	0.0 (0/7)	0.2 (2/5)
Total	2.7 (6/8)	0.7 (3/7)	0.6 (3/5)
Assemblage size	152 (70–333)	139 (68–288)	162 (36–258)

[a]From Matson *et al.*, 1980.

Helen Point components and their position on Figure 7-5 gives us confidence that there is a temporal difference. An excavation at the Garrison site (Kornbacher, 1989) demonstrates its close relationship with the next Gulf of Georgia phase and confirms the pattern reported by Carlson (1960). In contrast, the Old Musqueam radiocarbon dates show a clear separation from the later two subphases with an average of more than 2000 BP, in addition to artifact continuities with Locarno Beach.

The change from chipped stone industries to nonlithic industries has long been known on the Northwest Coast (H. Smith, 1903), and appears to take place largely within the Marpole phase in the Gulf of Georgia region. We earlier suggested a plausible reason for a shift from chipped stone to ground stone, and now venture a possible explanation for the increased presence of bone and antler artifacts in the archaeological record. This is the increased use of large, complex, composite objects, composed primarily of perishable components. This composite technology would be less transportable than a simpler one, postulated earlier, but could still be moved in an economy featuring large canoes. The elaborate reef net technology of the Straits Coast Salish would be the epitome of this important complex, perishable technology. Bone and antler tools could be used to make these implements (such as nets, baskets, etc.) or to arm them (harpoons, fishhooks), as Northwest Coast cultures move from less complex, more expedient technologies, to more complex technologies associated with permanent settlement.

It is here that we can make a statement about the difficulty of finding a termination date for the Marpole phase. The reduction of chipped stone and the increase in bone tools within the Marpole phase are exactly those traits that distinguish later cultures from Marpole. Burley (1980:39), for instance, argues that the transition lasts from 1650 to until 950 BP. Given also that one finds less chipped stone and more pointed bone objects on Island sites than contemporary sites on the mainland, it becomes very difficult to distinguish between Garrison subphase Marpole and later cultures. What is evident is a seamless evolutionary transition; it is simply very difficult to tell where one ends and the other begins, making the boundary somewhat arbitrary.

> Although the main features of C. E. Borden's Fraser delta sequence have stood the test of time, the Whalen II phase, which followed the Marpole phase (Borden, 1950, 1951, 1970), has generally been rejected by other workers. Later archaeologists have generally considered this culture to be a Marpole variant (Mitchell, 1971b:56; Burley, 1980:37–38; Fladmark, 1982:212). It is easy to see, though, why Borden thought Whalen II existed as a discrete culture. The diversity of archaeological artifact assemblages—as measured by the number of artifact classes per given number of artifacts—decreases through time until in the cultures that succeed

Marpole the diversity is very low indeed (see Chapter 8). Thus, there are fewer kinds archaeological items to reflect temporal change, resulting in all later material looking relatively similar. In addition to having little later cultural diversity to observe, Borden had a radiocarbon date from the bottom of the deep Stselax midden, his type site for the last major prehistoric phase (see Chapter 8), of 660 ± 130 ((S-20) BP (Borden, 1970; Wilmeth, 1978:80–81). It was eminently rational of Borden to hypothesize that all the later cultural material, because of its homogeneity, dated to the last 700 years or so, and to check if there was another phase between the end of Marpole (ca. 1400 BP) and the beginning of Stselax midden (700 BP). He found such a candidate at the Whalen Farm site. On top of the Locarno Beach component, he discovered a culture with relatively abundant lithics, little ground stone, composite toggling harpoon valves, and the first described microblades in the Gulf of Georgia area (Borden, 1950:20,25). A radiocarbon date of 1580 ± 140 BP (S-19; Mitchell, 1971b:62) was later run on a sample from the upper part of this component.

Unfortunately for the Whalen II phase, no other components similar to it have ever been reported in detail, and other workers noted similarities with the Marpole Culture (Mitchell, 1971b:55–56). Furthermore, as more radiocarbon dates were run, no large gap between Marpole and later cultures was found. In 1976 B. Seymour reported on a new excavation of Whalen Farm and concluded that the recovered material belonged to the Marpole culture. If the Whalen Farm II component was indeed a Marpole variant, the presence of microblades and abundant chipped stone indicates that it included the Old Musqueam subphase. B. Thom (1992a) has prepared the first full description of Borden's Whalen Farm II material, and selected a charcoal sample from near the bottom of this component for dating. This sample was assayed at 2110 ± 65 BP (WSU 4340), placing the early portions of this component into the Old Musqueam subphase and ending the mystery of the Whalen Farm II component.

The Marpole perishable industry is partly represented by finds from the Water Hazard (DgRs 30) site, which is likely associated with the nearby (750 m away) Beach Grove site (Bernick, 1989). This deposit, dated to the Beach Grove subphase, included numerous wooden wedges, cordage, and basketry (Figure 7-9). The most common basketry weave is open plain twining (Figure 7-9D) which was infrequent at the Locarno Beach site of Musqueam NE (DhRt 4), where plaited wrapped twining is the most abundant. Plaited wrapped twining, in turn, is absent from the Water Hazard site (Bernick, 1989:106). There are, though, some continuities in other basketry attributes, including the prominent presence of checker-plaited basketry (Figure 7-9A), 3/3 twill-plaited basket bases (Figure 7-9C), and cedar splint materials. Two-strand wrapped reinforcements and selvages (rim finishing) though present in the two collections (Bernick, 1989:105) occur as

different variants. Moreover, the false braid selvage that predominates at Water Hazard does not occur at Musqueam NE. This mixture of similarities and differences is exactly what would be expected if the two collections belonged to the same cultural tradition, separated as they are by 1000

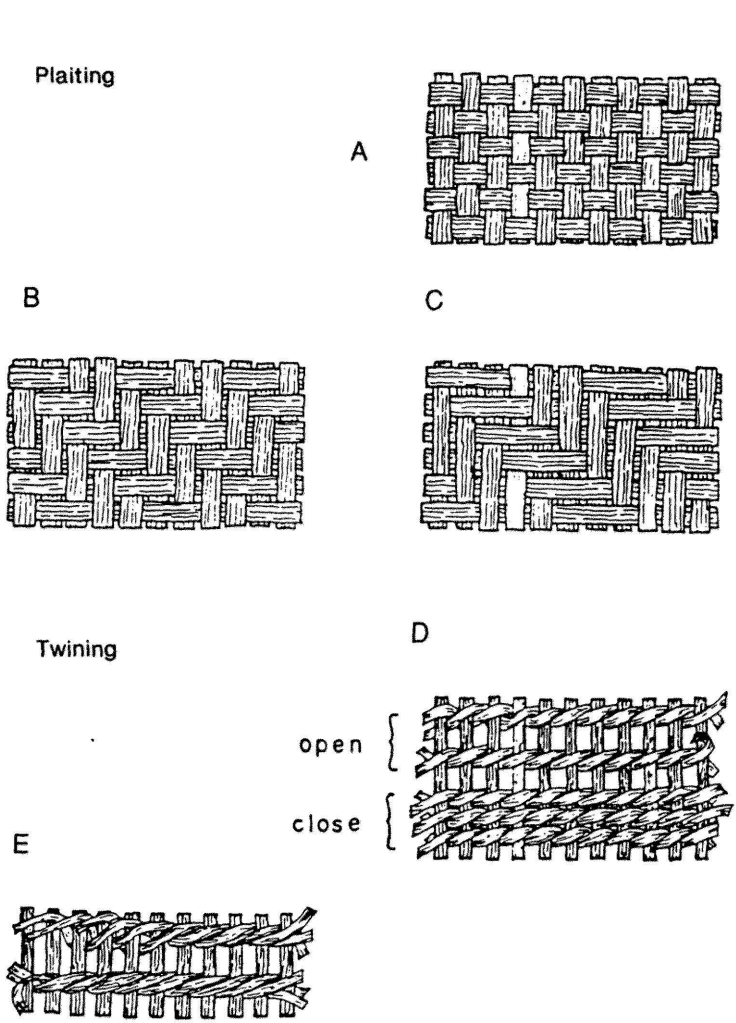


FIGURE 7-9 Marpole basketry weaves from the Water Hazard site. (A) checker plaiting; (B) 2/2 twill plaiting; (C) 3/3 twill plaiting; (D) two-strand (plain) twining; (E) three-strand twining. (From Bernick, 1989.)

years. Each collection, however, retains its uniqueness, indicating that they represent separate cultures.

Bernick's studies of basketry and other perishable material from the Gulf of Georgia has led her to conclude that the Marpole basketry is relatively elaborate and standardized. She concludes (pers. comm.) that the stylistic attributes are both more standardized and elaborated during the Marpole phase than either pre-Marpole or post-Marpole material. Furthermore, the design elements are shared with other Marpole "art" objects, such as those reviewed in this chapter in the sidebar on M. Holm's work.

Basketry from the Biederbost site (45SN100) (Figure 7-10), east of Seattle, which has two radiocarbon dates of approximately 2000 BP (Nordquist, 1976), shows the same styles and techniques as found at the Water Hazard site. Specifically, open-plain-twining (Figure 7-9D) and checker-plaiting (Figure 7-9A) predominate in Biederbost basketry as they do at Water Hazard (Bernick, 1989:106). Additional similarities in basketry and other perishable artifacts are reported by Bernick (1989: 104–106) and shown by Croes (1992b:354) through cluster analysis. These similarities make Biederbost the most southerly known certain Marpole site.

At the very southern end of Puget Sound, Chatters (1989:174–179) reports on the excavation of a probable house structure that may belong to the Marpole culture. Tualdad Altu (45KI59) is next to the Black River delta, and has a radiocarbon date of 1570 ± 90 (Beta 2794) BP. The artifacts are said to resemble those of the Marpole phase, and the feature remains include what was interpreted as a 7 × 17-m house (Chatters, 1989:174). Chatters found differences in artifact and faunal assemblages between the west end and east end of this structure. Whether or not this site should be included within the Marpole phase, it clearly demonstrates the presence of an equivalent level of complexity during the same time period at the southern end of Puget Sound.

In the other direction, the Marpole culture probably extends northward to Deep Bay (Figure 7-10) (Monks, 1977), on the east coast of Vancouver Island. Although this component is not accepted by all as truly Marpole (Burley, 1980:38–39; R. Carlson, pers. comm.), the analysis reported in the sidebar supports a Marpole membership. Shoemaker Bay I (McMillan and St. Claire, 1982) includes attributes of both Marpole and Locarno Beach cultures, but as the excavators conclude, is probably best thought of as being Marpole, in fact, the most westerly Marpole component (Figure 7-10). Millard Creek (Capes, 1977), even further north on the east side of Vancouver Island than Deep Bay (Figure 7-10), also includes material from the lower layers that might be from a Marpole component, but has more similarities with Locarno Beach. The Marpole culture, then, is found from near Seattle to Victoria, to Deep Bay—in short throughout the Gulf of Georgia and at least the northern half of Puget Sound.

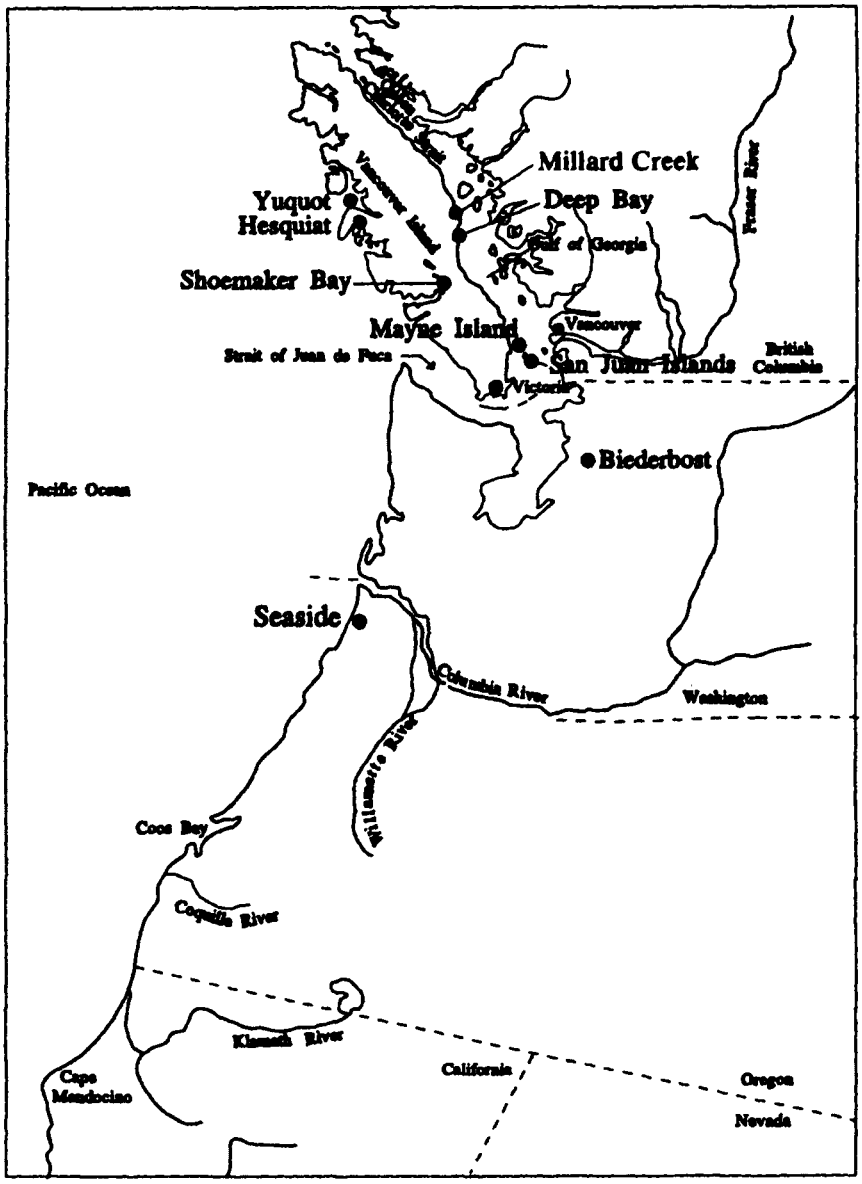


FIGURE 7-10 Marpole-equivalent sites in the central and south coasts.

Subsistence and Seasonality

In spite of the rather extensive artifactual and burial information from the Marpole phase, the information on subsistence is rather limited. Begin-

ning with the Old Musqueam subphase, we do have relatively complete subsistence records for two components: Glenrose (Matson, 1976, 1981) and Crescent Beach (Matson *et al.*, 1991; Matson, 1992). Glenrose is interpreted as a winter village site, although no structures were found. The extremely high abundance of salmon (without cranial bones), the presence of herring, and analysis of sectioned clams support this seasonality for Glenrose, as does the presence of geese, which winter in this area today (Matson, 1976, 1981).

In contrast to Glenrose, we find a clear evidence of springtime occupation at Crescent Beach, with the important resources being shellfish, (including clams such as *Clinocardium*, which can only be easily obtained in large numbers in the spring), flatfish, some herring, and abundant salmon that is inferred to have been stored (i.e., salmon remains lacking cranial parts). Fish, such as midshipmen, (Table 6-2) which can be obtained easily only in the spring, when they make nests under rocks in lower intertidal zones, reinforce the springtime occupation of this site. Even distinctions within the spring season can be made for some of these layers (Matson, 1992; Matson *et al.*, 1991). The number of layers present at Crescent Beach in the Marpole component, including layers with very little cultural material, indicates repeated reoccupation in the spring. This pattern is in contrast to the more generalized adaptation and more continuous occupation for the earlier St. Mungo layers and some of the Locarno Beach layers. Crescent Beach in Marpole times is clearly a springtime, flatfish and shellfish-oriented, limited-activity site.

An incomplete report on the subsistence remains from the Beach Grove site (Matson *et al.*, 1980) gives some indication of what is found on a site with numerous "house platforms," that is, a Marpole winter village. Salmon, flatfish, and herring are all abundant, indicating winter and springtime use. The clams sectioned for seasonality of death also support the inference of a winter–spring occupation (Matson *et al.*, 1980). This pattern is what one would expect for wintertime occupation, except that the flatfish were as abundant as salmon in this collection. Since cranial bones were not identified in this case, whether or not salmon were being procured from this site cannot be determined. It may be that the Beach Grove site was not only occupied in the winter, as indicated by the abundant salmon and herring remains, as well as the clam seasonality, but was also occupied well into the following spring, as partially supported by the presence of small amounts of eulachon (Matson *et al.*, 1980). This seasonality is plausible because Beach Grove is located across Boundary Bay from Crescent Beach (Figure 7-1), and the same statements made earlier about this bay being an ideal place to obtain starry flounder in the spring would hold true for both sites. Substantial quantities of *Clinocardium* were also recovered from Beach Grove, which also tends to corroborate an occupation during the spring.

Deep Bay is a third Marpole component with a relatively complete faunal

analysis (Monks, 1977, 1987). Monks demonstrates that this component is a springtime, specialized, herring fishing site, an activity that still occurs near Deep Bay today. The abundance of herring remains at this site is truly astounding, with more than 1 g of herring remains present in some 500 cc samples (Monks, 1977:175), which translates into approximately 55,000 remains per 10 cm level of a 2 m unit. The nonherring fauna are resources that would naturally be obtained in the same February–March season, and many are sea mammals and diving birds that would have also been feeding on the spawning herring as well. Unfortunately, the Deep Bay component, as mentioned above, is not accepted by all investigators as being "Marpole," although the assemblage analysis reported earlier indicates that it does belong to the Marpole phase. A somewhat similar interpretation to the Deep Bay site was made by Coupland (1991) for the Point Grey (Figure 7-1) site on the basis of two faunal analyses carried out on material recovered from two excavations in the 1980s. In these analyses, herring and bay mussel were the most common remains. Bay mussel is available locally today and, as we have indicated before, is easily gathered in early spring, in contrast to clams. Herring, are not now available here, although Coupland reports that at one time they were obtained not far away at Jericho Beach. On the basis of this information, Coupland argues that this large site is a spring herring and mussel exploitation site, but one occupied by a village-sized group.

The subsistence analyses confirm the presence of winter base camps based on stored salmon (Glenrose), and even winter villages equivalent in size to the largest historic examples, that may have been occupied well into the spring (Beach Grove). In addition, two limited-activity site types have also been identified. The first type is oriented to springtime flatfish fishing and clam digging, but with surprisingly large amounts of stored salmon also being consumed (Crescent Beach). The second limited-activity site type is a specialized spring herring procurement location (Deep Bay, Point Grey). Both of these activities fit well with ethnographic accounts of subsistence rounds.

Summary of the Marpole Phase

Notwithstanding some surprising weaknesses in the data, there is little doubt that by the middle of the Marpole phase, (circa 2000 BP) the Developed Northwest Coast Pattern of winter villages with large planked houses, dependence on stored fish, usually salmon, abundant sophisticated art, and ascribed status, as well as seasonal moves to specialized resource procurement locations, had evolved. Whether or not the achievement of the Developed Northwest Coast Pattern had been reached by the beginning of the Marpole phase is still an open question.

Although there is abundant evidence for large houses in the later two Marpole subphases, only the postmolds from the Long Harbour site on Saltspring Island are evidence of large plank houses earlier than 2000 BP. Similarly, definite evidence of ascribed status in the Old Musqueam subphase is currently absent, and if deformed skulls are a marker for significant inherited status, ascribed status is likely absent. Yet, by the beginning of the next subphase good evidence for both large, multifamily houses and ascribed status is present.

So, although the Marpole phase clearly represents the achievement of a pattern that is easily seen as the equivalent of ethnographic Northwest Coast peoples, this pattern may not have been present at the beginning. The development of this unique complex culture type is not unique to the Gulf of Georgia; there is good reason to believe that similar achievements occurred elsewhere on the Northwest Coast during the same time period.

Beyond the Gulf of Georgia

In spite of Marpole sites being present in Puget Sound and a "Locarno Beach" component at the entrance to the straits of San Juan de Fuca, (Hoko River), the Marpole time period is very poorly known on the Washington ocean coast. Wessen (1990) lists only the Ozette, Tongue Point, and Sand Point sites, all on the northern portion of the Olympic Peninsula, as having components that date to this period. According to Wessen (1990) Sand Point is the best studied, and it has an undiagnostic assemblage of bone objects, ground California mussel shell, some ground stone, and an unusual amount of chipped stone. At this point, all we can say is that there are sites in this area occupied during this period, and that they share some very general technological characteristics with the Marpole Culture.

On the west coast of Vancouver Island, however, substantially more is known about this time period, and this information indicates a similar stage of development as found in the Marpole Culture. The materials from Nootka territory derive from the work at Yuquot in Nootka Sound in the 1960s (Dewhirst, 1980) and to the south in the early 1970s in the Hesquiat area (Calvert, 1980; Haggarty, 1982) (Figure 7-10). The Yuquot site at Nootka Sound has been introduced before and we will start there.

Zone II is the stratigraphic horizon of interest at Yuquot. It has radiocarbon dates centering around 2000 years ago, and apparently lasted up until approximately 1200 BP. The main trench excavations are thought to be through the interior of a large house (Dewhirst, 1980:50) as indicated by a series of 17 rock-rimmed fire pits dating to approximately 2000 BP. These fire pits are often located close to each other, with one group of seven being particularly indicative of this trend. This pattern is argued to result from a permanent house, or perhaps more likely, a permanent house frame, which

was seasonally clad in planks. In spite of this plausible interpretation, no large postmolds were recovered, perhaps because of the "narrowness" of the 15-ft-wide trench compared to the house structure!

The artifact assemblage is notable for the near absence of chipped stone. For the first time at Yuquot, large numbers of shaped abrasive stones are present, as are stone celts. Bone awls, needles, and cedar bark beaters and shredders were recovered, along with abundant evidence of the use of composite fishhooks. The latter includes pointed bones and fishhook shanks. Composite harpoon valves are present in a wide variety of forms and sizes. Unilaterally and bilaterally barbed harpoons were also present, some with unilateral and others with bilateral line guards. A variety of personal adornment artifacts were recovered, including pendants, beads, tooth pendants, and whalebone clubs. Dewhirst (1980:341) infers that these objects "suggest status and ranking in the society."

Although a complete faunal analysis is not available, an analysis of shellfish shows that the rocky foreshore-dwelling California mussel and whelks dominate this component (Clarke and Clarke, 1980). A wide variety of birds are reported (McAllister, 1980) and are inferred to represent occupation between February and October. This information conflicts with the interpretation of a multifamily permanent household offered above. It may be, however, that this is a summer village, as Nootkan peoples historically had summer villages on the outer coast, such as Yuquot, and winter villages on the inner coast. The Yuquot site shows many fascinating similarities and differences with the Gulf of Georgia Marpole material, but further work clearly is needed before these issues can be settled. Some hints, though, as to the situation can be inferred from one site excavated during the Hesquiat Project to the south on the west coast of the Vancouver Island.

A number of outer and inner coast sites were excavated in the 1970s as part of the Hesquiat Project (Calvert, 1980; Haggarty, 1982). One of these sites, a long narrow rock shelter (DiSo 9) on the inner coast, has produced four radiocarbon dates between 1400 and 1850 BP (Haggarty, 1982:166) from what is referred to as Component I. No chipped stone is found among the 148 artifacts assigned to this component. Instead, 18 abrasive stones were recovered, along with seven parts of composite harpoon valves and 43 pointed bone implements. Awls and needles make up another 32 items, and three California mussel shell adze blades and two knives were also present (Haggarty, 1982:159–160).

This site is near a historic inner coast winter village (Calvert, 1980), and so may serve as a counterpoint to Yuquot. Calvert (1980), building on her pioneering work in applying "ecological archaeology" to the Northwest Coast, analyzed the mammal, bird, fish, and shellfish remains. The mammal assemblage was dominated by northern fur seals with harbor seal and deer approximately equally represented in a distant second place (Calvert, 1980: 151, 154). Loons, cormorants, and ducks were the abundant birds (Calvert,

1980:161, 164–165). The identified fish remains (Figure 7-11) are slightly over half herring followed by about one-fourth as many midshipman, and by about one-eighth as many salmon (Calvert, 1980:171, 176). Among the shellfish, over 50% by weight are butter clams, 30% littleneck clams, 10% whelks, and only 5% California mussel (Calvert, 1980:303). The abundance of herring points to a late winter occupation, although Calvert finds evidence of occupation during other seasons as well.

The limited information for the west coast of Vancouver Island indicates a similar stage of development to that found in the Marpole Culture, but an archaeological culture different in most particulars. It is possible that the winter inner coast village and summer outer coast village pattern, usually thought to have developed only during historic times (Calvert, 1980: 106–107; Drucker, 1951), had significant precursors at this time. Many of these differences with the Gulf of Georgia can be assumed to be the result of Salish and Wakashan ethnicity.

Further north in the Queen Charlotte Strait, the Obsidian Culture is thought to continue during this time (Mitchell, 1988a). If this is so, the storage-oriented, Developed Northwest Coast Pattern stage had yet to be achieved there.

Although the archaeological material from the lower Fraser valley is difficult to compare with the Gulf of Georgia, for the reasons discussed in the last chapter, we believe that the full Developed Northwest Coast Pattern was achieved there at this time also. The lower Fraser valley contained the main concentration of the seated human figurine bowls, not the coast, as is true of the carved stone bowls in general. Large burial mounds are present well up the valley, at least as far as Scowlitz, as indicated earlier. Thus it appears the people inhabiting the valley shared with coastal groups some of the more exotic aspects of the Marpole Culture. Furthermore, even though the house form and artifact assemblage—usually limited to imperishable lithics inland—appears to be quite different, the Katz site (G. Hanson, 1973) may

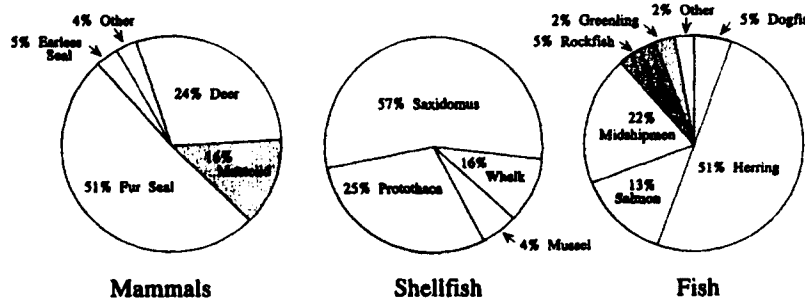


FIGURE 7-11 DiSo 9 (Hesquiat region) faunal remains, old component (from Calvert, 1980).

indicate a similar level of complexity. This site, near Hope, at the inland end of the lower Fraser valley, dates to Marpole times, and includes two rows of more than 20 regularly spaced house pits, a village layout similar to ethnographic coastal villages.

SOUTH COAST

There are no other sites in Washington south of the Black River delta known to us that are Marpole or of an equivalent stage. Near the mouth of the Columbia, though, on the Oregon side, is the very interesting Palmrose site at Seaside (Phebus and Drucker, 1979; Connolly, 1992). It is located within 5 km of Tillamook Head, next to the current channel of the Necanicum River, and within 1 km of the current coastline (Figure 7-10). This site was excavated over a dozen years in the 1960s and 1970s by dedicated amateurs who excavated over 230 5 × 5-foot units, and obtained 19 radiocarbon dates ranging from 2600 to 1600 BP, coeval with the Marpole phase (Connolly, 1992:25–28). Of particular interest is the presence of a rectangular, semi-subterranean house structure over 6 m wide and 12 m long (Phebus and Drucker, 1979). The original excavators interpreted the dates as indicating three occupations of the house, one at 2500 BP, a second at 2200 BP, and a third at 1800 BP (Phebus and Drucker, 1979).

In 1988 minor contract excavations took place at the Palmrose site in conjunction with possible road changes (Connolly, 1992). Working with the cooperation of the previous excavators, this investigation was able to relocate previous excavations, clean up profiles, and confirm the presence of the house structure in this 2.5-m deep midden. In this analysis, the house structure appears to be 6 m by at least 16 m (Connolly, 1992:31). A charcoal sample from the lowest of a series of superimposed hearths in the middle of the structure gave a date of 2060 ± 100 (Beta-28853) BP, confirming that this very large (over 100 sq. m) structure is at least 2000 years old, though not the 2500 BP estimated by the previous investigators.

The 1988 excavators also carried out a variety of faunal analyses. The midden consists of large numbers of clams, butter, littleneck, and horse clams, none of which are present locally today. The easy inference is that the Necanicum River used to enter a muddy bay in the shadow of Tillamook Head, rather than the sandy beaches present there today. A number of butter and littleneck clams were sectioned and the season of death is concentrated in late winter–early spring (Connolly, 1992:117). Among the mammals, sea mammals, fur seal, and Steller sea lions are most abundant, and elk is the only common land mammal. A wide variety of bird remains were present, but none were very abundant (Connolly, 1992:128–129). Although a wide variety of fish species were present, 68% of the identified fish

remains were salmon, much higher than that found at other nearby sites (Connolly, 1992:156).

The Palmrose site is inferred to have most of the attributes of the Developed Northwest Coast Pattern: a stored-salmon-based economy and a multifamily planked house, occupied in the winter, probably by a large cooperative group. Even a Marpole-like emphasis on decorated objects, including a variety of zoomorphic figures, is present (Connolly, 1992:97–102), along with composite toggling harpoon valves. Evidence of ascribed social status is absent but this is difficult to infer without burial remains. In all, it is remarkably consistent with the expectations of the Developed Northwest Coast Pattern, given that only a single site of this culture is currently known.

South of the mouth of the Columbia River, no clear equivalent stage could be found along the coast, and the archaeology of the last 1500–2000 years will be found in Chapter 8. On the north coast, however, there is clear evidence of this stage of initial achievement of cultural complexity.

NORTH COAST

Archaeological evidence of the Developed Northwest Coast Pattern on the north coast, including the emergence of rank society, is found in the period beginning at about 2500 BP, roughly contemporaneous with developments on the central coast. Although not as clearly demonstrated as in the Gulf of Georgia region, evidence for social stratification is present in Prince Rupert Harbour, particularly from the Boardwalk site, where a large human burial assemblage has provided evidence of high-status interments, long-distance trade in luxury items, elaborate personal adornment, and the emergence of a possible warfare complex in the period from 2500–1500 BP (MacDonald, 1969, 1983a; MacDonald and Inglis, 1981).

Prince Rupert Harbour

Although detailed information on Prince Rupert Harbour sites (Figure 7-12) is lacking, MacDonald (1983a) and MacDonald and Inglis (1981) provided general summaries of events during this period. Most existing artifact forms from the first half of Period II (3500–2500 BP) are thought to continue into the second half (2500–1500 BP), and some new forms are added. The overall pattern of a net accretion of artifact forms through time continues. Among the more utilitarian items added to the artifact inventory are bark shredders and bark peelers, some with zoomorphic designs, which first appear at about 2000 BP (MacDonald, 1983a:102). Biconical stones also are said to appear at about this time (MacDonald, 1983a:102). Elliptical in

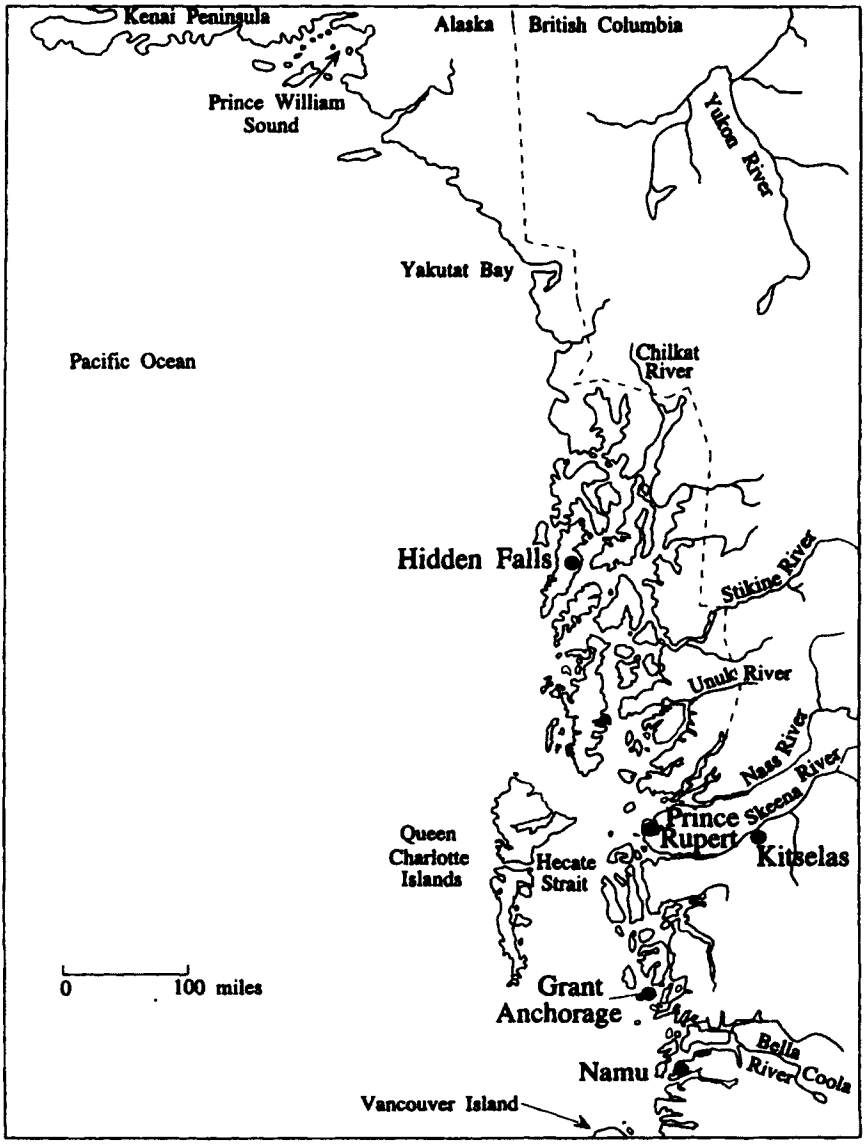


FIGURE 7-12 North Coast archaeological sites and localities (2500–1500 BP).

shape with conical ends and usually made of limestone or sandstone, the function of these stones is uncertain, although Drucker (1943:57) suggested they may have been abrasive stones used for sanding large planks or other large pieces of worked wood. MacDonald (1983a:102) further sug-

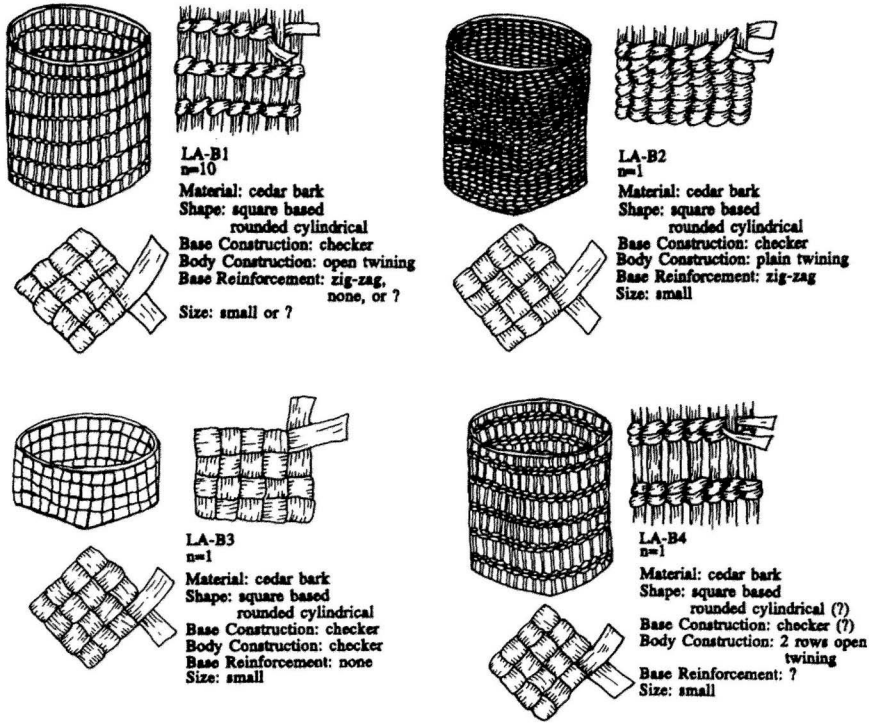
gested that the purpose of smoothing planks may have been to prepare them for painted decoration.

The possible emergence of a warfare complex at Prince Rupert Harbour during Period II is reflected in other additions to the artifact assemblage. Four decorated bone clubs and several undecorated bone clubs were recovered, mainly from burial contexts. Stone clubs from the Prince Rupert–Skeena area have so far been associated with relatively recent dates. A decorated stone club from Kitandach has been dated to between 2000 and 1500 BP (MacDonald, 1983a:114), whereas an impressive cache of stone clubs, many of them decorated, found at Hagwilget Canyon, has been said to date to about 2000 BP (Duff, 1963, 1983). As we will demonstrate, material evidence for conflict is a striking addition to archaeological assemblages in the Prince Rupert area during this period. In contrast, most central coast sites lack evidence of warfare at this time, although two "clubs" were recovered from the Marpole site (see sidebar on Marpole art).

Perishable objects have been recovered from Prince Rupert sites dating between 2000 and 1500 BP near the end of this period. Most of this material comes from water-logged deposits at the Lachane site (Inglis, 1974). Included in the assemblage are wooden boxes and bowls, wedges, handles for adzes and chisels, canoe paddles, and a wide variety of basketry and cordage (Inglis, 1976; Croes, 1989b). This rare material supports MacDonald's model of cultural continuity in the Tsimshian area, as described in the sidebar.

> Recovery of basketry from Lachane, dated from 2500–1600 BP, is of particular importance because it has been used to test models concerning the continuity of Tsimshian culture in the Prince Rupert area (Croes, 1989b). In a detailed comparative study, Croes found a high similarity between Lachane basketry and historic Coast Tsimshian basketry in terms of construction materials, manufacturing techniques, forms, and sizes, while noting differences between the Lachane and Haida–Tlingit baskets (Figures 7–9 and Table 7-4). The prehistoric occupants of the Lachane site and the historic Tsimshian usually used cedar bark, whereas the Tlingit and Haida commonly used spruce roots. Tsimshian basketry commonly uses checker-plaiting techniques for basket bodies, although the open twining was found on 10 of 16 Lachane baskets. Plain twining is the main technique on Haida and Tlingit basket bodies. Checker plaiting for basket bases dominates both Tsimshian and Lachane collections, in contrast to the plain twining and alternate plain twining or checker found in the Haida and Tlingit collections. Square-based cylindrical baskets are commonly found in both Lachane and Tsimshian collections in contrast to round bases on the Haida and Tlingit baskets. Finally, all Lachane and historic Tsimshian twining have weft stitches that slant up from left to right (/), whereas both Tlingit and Haida twining wefts slant up from right to left (\) (Croes, 1989b:175).

TABLE 7-4 Lachane Basketry Classes and Comparisons with Tsimshian and Tlingit/Haida. (From Croes, 1989b).



LA-B1
n=10
Material: cedar bark
Shape: square based rounded cylindrical
Base Construction: checker
Body Construction: open twining
Base Reinforcement: zig-zag, none, or ?
Size: small or ?

LA-B2
n=1
Material: cedar bark
Shape: square based rounded cylindrical
Base Construction: checker
Body Construction: plain twining
Base Reinforcement: zig-zag
Size: small

LA-B3
n=1
Material: cedar bark
Shape: square based rounded cylindrical
Base Construction: checker
Body Construction: checker
Base Reinforcement: none
Size: small

LA-B4
n=1
Material: cedar bark
Shape: square based rounded cylindrical (?)
Base Construction: checker (?)
Body Construction: 2 rows open twining
Base Reinforcement: ?
Size: small

Basket 'Functional' Classes	Lachane	Tsimshian	Tlingit/Haida
Cedar bark, square based rounded cylindrical, checker-plaited base, twined or plaited body weave basket	16 (100%)	28 (61%)	
plaited body weave	4 (25%)	23 (55%)	
twined body weave	12 (75%)	5 (12%)	
Other and distinctive Tsimshian basket classes		14 (39%)	
Other and distinctive Tlingit/Haida basket classes			55 (100%)
Other and eqivalent Tsimshian and Tlingit/Haida basket classes			
Total	16	42	55

The similarities between Lachane and historic Tsimshian basketry provides solid support for MacDonald's model of cultural continuity in the Tsimshian area for 2000 years (Croes, 1989b:199). The marked contrast between Tsimshian area basketry and that of the Tlingit and Haida, which may also have considerable antiquity, indicates that a certain amount of cultural distinctiveness was maintained within the north coast cultures, in contrast with MacDonald's (1969:244) view of all three groups being a cotradition.

In terms of evolving social complexity, the most important additions to the Period II artifact assemblage at Prince Rupert Harbour were personal adornment items, many of which were manufactured from exotic raw materials, and most of which were recovered from burials. Copper, obsidian, jet, amber, and *Dentalia* are all materials that must have been imported from considerable distances, and reflect the development of long- distance trade networks (MacDonald and Inglis, 1981; MacDonald, 1983a).

The nearest native copper source to Prince Rupert Harbour is the Copper River, north of Tlingit territory. Copper is also present in some Marpole age burials in the Gulf of Georgia. *Dentalia* shells were acquired historically from Vancouver Island via trade (MacDonald *et al.*, 1988) although this shellfish is actually present numerous places along the Northwest Coast.

Most of the copper in the Period II burials was fashioned into personal ornaments, including copper bracelets, earrings, tubular rolled beads, and copper sheets wrapped around cedar rods (MacDonald, 1983a:105). Large quantities of sea otter teeth, perhaps acquired via trade from the Queen Charlotte Islands, were found in two Prince Rupert Harbour burials, one at Boardwalk and the other at Dodge Island, both said to date to about 2500 BP. *Dentalia* shells, used in necklaces and as ear pendants, were recovered in other burials at Boardwalk (MacDonald, 1983a:106). Shell disk beads were also found in considerable quantities at the Boardwalk site.

The burials from Prince Rupert Harbour do not represent a single mortuary population. Although many may date to the middle of Period II, the range of dates is from 3500 to 1500 BP (Cybulski, 1990:55), covering all of Period II. Nevertheless, there seems to be an association between the initial appearance of inferred high-status burials and the evidence for warfare (MacDonald, 1983a:102). The apparent co-occurrence of these elements at about 2500 BP indicates that social ranking and warfare may have evolved contemporaneously as part of the same cultural complex, an issue discussed in the sidebar.

The Prince Rupert burials from this time period also provide support for the warfare hypothesis. The vast majority of Period II burials do not have grave goods. Cybulski (1990, 1992) noted a high incidence of forearm fractures, often called "parry fractures," which appear to relate to attempts to protect the head from a blow. In addition, some skulls were

found with depression fractures. The size and shape of these fractures closely match the knoblike butts of stone clubs, which also first appear in this period, ca. 1700 BP (MacDonald, 1983a:114). Cybulski (1992:154–158) presents data for inferred "violence" being more common among males than females and being much higher on the north coast than in the Gulf of Georgia. The Prince Rupert male burials fit the violence profile (Cybulski, 1992:157) and must include burials from this time. The taking of trophy heads during this period is suggested by evidence of decapitation, seen in some Boardwalk site skeletons that lack skulls and show cut marks on the cervical vertebrae (MacDonald, 1983a:106). Slave raiding may have been one important source of conflict in the Prince Rupert Harbour area at this time, as it was in the Tsimshian area in later times (Mitchell, 1984; Mitchell and Donald, 1985).

Perhaps the most elaborate grave of all comes from the Boardwalk site and is thought to date to about 2500 BP. It is the burial of an adult male whose grave goods include copper bracelets, copper-wrapped sticks, and a cache of weapons, including a killer whale jaw club, a basalt dagger, and a whalebone club. The whalebone club (Figure 7-13) has an intricately carved handle with a human face in profile surmounted by an animal headdress (MacDonald, 1983a:110).

The emergence of social complexity on the north coast has not been associated with any major changes in patterns of resource exploitation (Stewart, 1977; Ames, 1986). Salmon was probably the main subsistence resource at Prince Rupert Harbour at this time, but good evidence to support this assertion is still lacking. Existing faunal reports do not indicate clearly the importance of salmon relative to other taxa and lack the detail necessary for us to test this idea. Moreover, ratios of salmon body parts to head parts, which can be an indicator of large-scale storage, are also lacking. We find it difficult to believe, however, that storage was not being practiced at Prince Rupert Harbour at this time, given the other cultural developments and the earlier evidence for storage on the north coast. We believe that future research at Prince Rupert Harbour will reveal that storage was an important part of the Period II economy.

One subsistence resource that may have been added to the economy some time during Period II was eulachon (May, 1979). Its presence in the Ridley Island faunal assemblage at Prince Rupert Harbour suggests that the annual spring move to the Nass River reported historically may have been underway by this time (Fladmark *et al.*, 1990:233).

We know surprisingly little about residential patterns at Prince Rupert Harbour during the latter half of Period II. A number of excavated sites have been inferred to be winter villages during this time (MacDonald and Inglis, 1981), based on the presence of large, deep shell middens and house depression, at some sites. For the most part, house features have not been investigated. Ames (1990) reports measurements for two undated house floors at the Boardwalk site, which he infers are younger than those at the

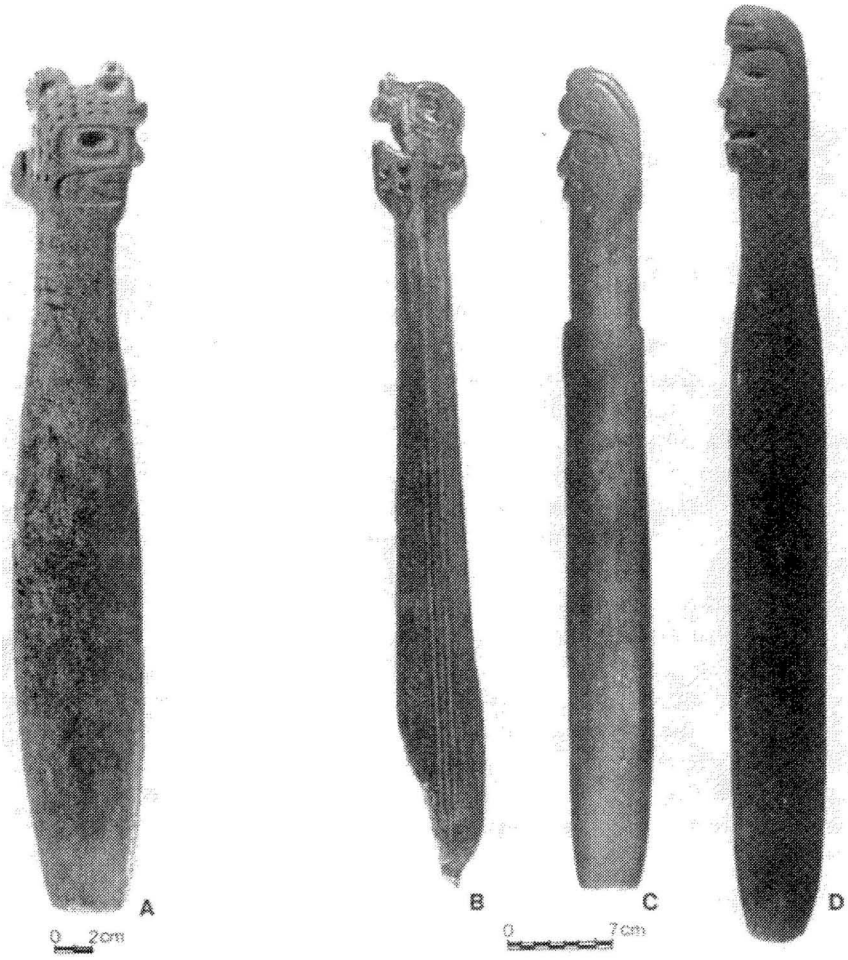


FIGURE 7-13 Prince Rupert bone clubs. (A) circa 2500 BP; (B–D) recent central coast bone clubs. (MacDonald, 1983.)

Paul Mason site, and may well date to this period. Both Boardwalk house floors were an estimated 9 m long. One was 6 m wide, giving a floor area of 54 sq. m; the other was 5 m wide, for a floor area of 45 sq. m. Ames estimates household sizes of 11 and 10 people, respectively. Similar in shape to the Paul Mason houses, the Boardwalk dwellings would fit within the low end of the Paul Mason site size range.

The Boardwalk site is large and could have accommodated a number of houses. The two house floors reported by Ames may have been of average size, or they may have been among the smallest at the site; we have no way of assessing the representativeness of this sample. The discovery of large

house remains in Northwest Coast middens remains a difficult task, given the usually small excavation units used by archaeologists. Nevertheless it is interesting that the two houses at Boardwalk, which appear to coincide with emerging social complexity, are no larger than the earlier "egalitarian" Paul Mason phase houses.

Skeena River

At Kitselas Canyon the period beginning about 2500 BP is represented by the Kleanza phase (Allaire, 1979; Coupland, 1988a), at present known only from Gitaus, where a radiocarbon date of 2390 ± 85 (NMC 1318) BP (Coupland, 1988a:120) has been obtained. No evidence of Kleanza phase material was found at the Paul Mason site. Technologically, the Kleanza phase assemblage differs in only minor ways from that of the preceding Paul Mason phase. Similarities include low proportions of chipped stone tools, 19.7% in the Kleanza phase (Allaire, 1979:42), and high proportions of cobble implements and spalls, 55% of the total assemblage (Figure 7-14). Most artifact forms from the Paul Mason phase are also found in the Kleanza phase.

The most notable difference in tool proportions is an increase in frequency of shaped abraders from 6% in the Paul Mason phase to 12% in the Kleanza phase (Coupland, 1988a:231). This change may be related to an increase in the manufacture of ground stone and bone and antler tools during the later phase. Some new artifact forms also appear in the Kleanza phase. Two flat, round, perforated stones, which probably served as net sinkers, were recovered. They are similar in form to the perforated net sinkers that appear in the latter half of Period II at Prince Rupert Harbour. An atypical stemmed or "fish-tailed" projectile point and three small chipped and partly ground adze blades (Allaire, 1979:42), also present in the Kleanza phase assemblage at Gitaus, have no counterpart in the Paul Mason phase. Two items of personal adornment, a slate mirror and a small, highly polished T-shaped labret, are also unique to the Kleanza phase. Labrets are said to be present at Prince Rupert Harbour from as early as 3500 BP, but slate mirrors do not appear there until about 1000 BP (MacDonald, 1983a:100, 105). Both items are traditionally associated with high social status. A slate dagger or highly polished knife, similar to the Period II daggers from Prince Rupert Harbour, was also recovered from the Kleanza phase at Gitaus.

No definite house remains have been recorded for the Kleanza phase. Allaire (1979:48), however, infers that a dense, widespread litter of fire-cracked rock, a feature not found anywhere in the lower levels at Gitaus, and a single large postmold are the results of a permanent dwelling.

Poor organic preservation limited the recovery of faunal remains from the Kleanza phase component. A few charred fragments of groundhog

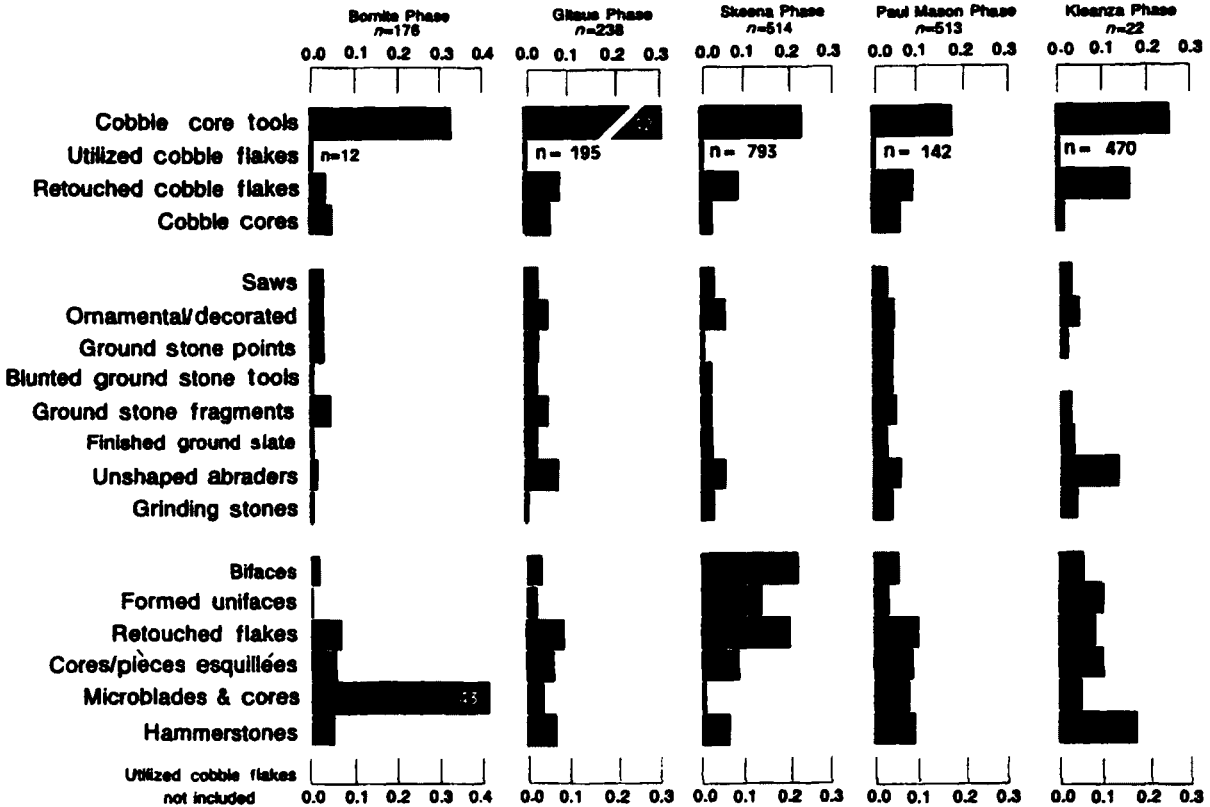


FIGURE 7-14 Kleanza phase artifact assemblage at Kitselas Canyon, compared to earlier phase assemblages (after Coupland, 1988a).

(*Marmota* spp.), beaver, and fisher or marten (*Martes pennanti*) remains were the only elements recovered (Allaire, 1978). The paucity of remains precludes any attempt to reconstruct Kleanza phase subsistence, but fishing, especially for salmon, was probably important given the location of the site and the presence of net sinkers.

Evidence for increasing social differentiation during the Kleanza phase is rather limited and equivocal. The labret may be an indication of status differences, but as we noted the symbolic importance of this artifact class as a prehistoric status marker on the Northwest Coast is not well understood. As we have seen, labrets have been recovered from cultural components elsewhere on the coast that are thought to predate the emergence of ascribed social ranking. Slate mirrors were worn historically by Tsimshian women of high status (McNeary, 1976:68), but the antiquity of this custom is unknown. These artifact forms occur rarely in the Kleanza phase assemblage, so it is possible that access to them was limited only to high-status individuals. In the absence of burial evidence at Gitaus, however, we do not know if possession of these objects cross-cuts age and sex lines.

Although evidence of ascribed status differences during the Kleanza phase is not strong, it should be noted that the appearance at Kitselas Canyon of possible status markers and prestige goods from distant sources coincides with better evidence for social complexity at Prince Rupert Harbour. The Kleanza phase is clearly participating in the coastal culture, and we think it likely that the changes in society inferred to be occurring at the coast at this time were also occurring at Kitselas Canyon.

Central Coast of British Columbia

Evidence for the initial achievement of the Developed Northwest Coast Pattern is rather limited elsewhere on the north coast. On the central coast of British Columbia (Figure 7-12), in the Hecate Strait–Milbanke Sound area, structural remains from a prehistoric house have been recovered from the Grant Anchorage site (Simonsen, 1973). The remains include two charred wooden board features and another feature of badly decayed boards. Simonsen (1973:66) believes that both features represent portions of two sides of an inner platform of a house. The size and shape of this house are unknown, but the suggestion of an inner platform with surrounding raised benches is very similar to the house construction technique reported ethnographically and at the Paul Mason. A radiocarbon date of 2110 ± 110 (GaK 2755) BP (Simonsen, 1973:67) was obtained from charred wood from one of the Grant Anchorage features. Another sample of charred wood from a possible wooden dish yielded a date of 2090 ± 100 (GaK 2757) BP (Simonsen, 1973:67). This structural evidence and associated artifact assemblage are in broad agreement with other evidence from this stage, but can hardly be considered to be definite in-

dications by themselves that the Developed Northwest Coast Pattern had been achieved.

Evidence of intensive fishing on the central coast of British Columbia is seen in the presence of numerous fish traps (Pomeroy, 1976, 1980). Large complex traps tend to be associated with important salmon spawning streams in the northern Kwakiutl region according to Pomeroy's (1980) study. Pomeroy (1976:173) notes that because sea levels in this area have remained stable since about 3000 BP, some of these traps may be this old, although no direct dates are available.

This time interval, represented by late Period 5 and early Period 6 deposits, and by radiocarbon dates ranging from 2440 ± 100 (GaK 3119) to 1840 ± 80 (GaK 3124) BP (R. Carlson, 1991a:94) witnessed the continued economic decline at Namu. Salmon declines to 50% of total identified faunal remains, the lowest levels of abundance for any period of occupation at the site. Harbor seals are almost absent from the modest assemblage. The presence of raccoons and bald eagles, both scavengers, suggest periodic site abandonment (Cannon, 1991:41). Clams now predominate over mussel in the shell deposits, and were mainly collected during the late spring–summer season (Stevenson, 1977). The proportions of minor fish species all increase, including ratfish (*Hydrolagus colliei*) 10%, dogfish (*Squalus acanthias*) 2%, and cod (*Gadidae*) 6%, perhaps to compensate for the decline in salmon.

In contrast to the evidence of economic decline at Namu through this period, the artifact assemblage continued to expand, reaching maximum diversity by 1800 BP (Luebbers, 1978:62). New additions after 2500 BP include obsidian end scrapers and gravers, mussel shell adzes, and wide barbed bone points as well as fishhook barbed points, both of which were added to other barbed bone point forms that were introduced just before 2500 BP. Lanceolate and leaf-shaped flaked stone projectile points continue to be present. Declining salmon abundance and the increasing diversity of the artifact assemblage may be related to a change in seasonality of site occupation. A change in seasonality is indicated by the abundance of clams and their seasonality, and by the more complete range of artifact types.

In general, the artifact inventory of the central coast of British Columbia area shows a steady decline in flaked stone technology during this period, and steady increases in ground stone and bone tools (Hobler, 1990:304). This pattern is, of course, the same as that seen elsewhere on the central and north coasts.

Southeastern Alaska

Hidden Falls III is the main site component for this time period in southeastern Alaska. The artifact assemblage does not appear to have changed significantly from the preceding period. The faunal assemblage continues

to show evidence of salmon storage (Moss, 1989a). The most important change occurred in the shellfish assemblage, which shows increasing diversity and decreasing mussel abundance through time. By the end of Component III, about 1300 BP, mussel accounted for 39% of the shell deposit; clams 56.5% (Erlandson, 1989:143). More tentative is the inference of winter village occupation at Hidden Falls during this period. This inference is based on the evidence for storage and the presence of numerous hearth areas and large postmolds, but without any clear house-floor features.

The Sarkar Entrance site on Prince of Wales Island is dated by four radiocarbon age determinations from 1900 to 760 BP (Rabich-Campbell, 1984). The artifact collection is generally consistent with that from Hidden Falls III, although a ground slate point with a fishtailed base is unique in southeastern Alaskan sites of this period. Seasonality and site function evidence is unavailable for Sarkar Entrance during this period, but a later component includes large house depressions.

Queen Charlotte Islands

The period from 2500 to 1500 BP is probably the least understood of all periods of occupation on the Queen Charlotte Islands. The sequence at Blue Jackets Creek terminated at about 2000 BP, whereas occupation of the Tow Hill site on the north shore of Graham Island is inferred to date between 3000 and 2000 BP (Severs, 1974a, 1975; Fladmark, 1989), but is not yet fully reported. The upper deposit at Lawn Point is dated at about 2000 BP and contains heavy pebble choppers, retouched flakes, and evidence of bipolar core reduction (Fladmark, 1986a, 1989). The general trend of increasing similarity to north coast mainland cultural traditions apparently continues on the Queen Charlotte Islands during this period with the full development of the pecked and ground stone industry, increasing proportions of bone and antler tools, and expansion of the marine subsistence base (Fladmark, 1989:216; Acheson, 1991:91).

Summary of the North Coast

The achievement of the Developed Northwest Coast Pattern probably occurred on the north coast between 2500 and 1500 BP, although the evidence for this achievement is not as strong as that seen on the central coast. Only in recent years have artifact and faunal assemblages from north coast site components dating to this period been fully reported (e.g., Allaire, 1979; Davis, 1989; Cannon, 1991). Detailed information from the important Prince Rupert Harbour sites is still lacking (although Ames has prepared a manuscript), which makes a review of the evidence difficult, particularly because we understand that the dating of much of this material

is troublesome. Nonetheless, from the general indications, especially from the Boardwalk site burials, we can be relatively confident that ascribed social inequality evolved during this period. The inclusion of elaborate grave goods in some burials is likely indicative of status differences, whereas the evidence of violent deaths, the presence of weapons, and the appearance of exotic luxury goods, demonstrating long-distance trade, are all features consistent with a complex, possibly stratified society.

At present, the existence at Prince Rupert Harbour of formal winter villages with multifamily households based on a stored salmon economy during this period is more assumed than demonstrated. This possibility is strengthened by the presence of a formal winter village at Kitselas Canyon during the preceding period (Coupland, 1988a), and by the evidence of salmon storage at Hidden Falls III (Moss, 1989a). Although not all elements of the Developed Northwest Coast Pattern are present at any single site, all aspects are attested to, indicating that this stage was reached during this period.

SUMMARY

It is interesting to see how the full achievement of the Developed Northwest Coast Cultural Pattern is demonstrated by different lines of evidence on the central coast and on the north coast. Not surprisingly, the largest and most thoroughly studied body of data comes from the Gulf of Georgia area where archaeological research has been the most intense. During the Marpole phase, all aspects of the Developed Northwest Coast Pattern are present, including large winter villages with enormous, multifamily planked houses, an economy based on stored salmon supplemented with other seasonal resources, highly developed art, and good evidence of Fried's (1967) rank society. The long-held opinion that the Marpole phase represents the fully Developed Northwest Coast Pattern is confirmed, although it was only in the late 1980s, with the comprehensive burial study by Burley and Knusel (1989), that all aspects of the pattern were convincingly demonstrated. Furthermore, it is not clear that all traits associated with the full achievement of the Developed Northwest Coast Pattern were present at the onset of the Marpole phase. Cranial deformation, a likely indicator of hereditary status differentiation, is not associated with the Old Musqueam subphase, but only with the later Beach Grove and Garrison subphases. Thus, presently, the full achievement of the Developed Northwest Coast Pattern can not be securely dated in the Gulf of Georgia prior to 2000 BP.

The recent report on the Palmrose site at Seaside, Oregon, details a culture with an economy, age, at least one large planked house, and artifacts very similar to the Marpole phase. Although burial details are lack-

ing, the close similarities in other aspects support an inference that this culture also belongs in the Developed Northwest Coast Pattern.

In contrast with the relatively detailed chronological, subsistence, and seasonality information available for the central coast, we currently only have generalities for the important Prince Rupert Harbour material. There are still no convincing demonstrations of winter villages with large houses or a stored salmon economy at Prince Rupert between 2500 and 1500 BP. There is, however, material evidence for warfare, an important element of the Developed Northwest Coast Pattern on the north coast. This evidence of conflict points to the existence of at least one important difference between the northern and central coasts in the evolution of the Developed Northwest Coast Pattern. Clearly regional variability exists, not only in this pattern, but also in how it developed.

Although the Prince Rupert burial assemblage provides the best evidence for ascribed status during this period, these burials are not well dated nor have they yet been reported in sufficient detail for others to evaluate. In some ways the situation with the north coast burials resembles that seen on the south coast prior to the analysis by Burley and Knusel (1989). Plausible arguments exist for high status in some individual burials, but no convincing broad-based study has been conducted. We have little doubt that such a study will demonstrate convincingly the existence of ascribed status differences at Prince Rupert by the end of this period, and that future research will clearly show the presence of large, permanent winter villages and an economy based on storage. We do wonder though, whether future investigations will find that houses from this period were as large as those of the historic period, a question we will explore further in Chapter 8. If the house sizes remain relatively small during this period, this would be another important difference between the northern and central coasts.

Convincing evidence for the geographical distribution of ethnic groups in a pattern similar to that found historically is present on both the central and north coasts. The distinction between the Wakashan area on the west coast of Vancouver Island and the Salishan area in the Gulf of Georgia is very clear in the archaeological record. Even within the Wakashan area, there appear to be clear differences between the west Vancouver Island material from Hesquiat and Yuquot, and the the Queen Charlotte Strait material, in historic Kwakiutl territory. Similarly, separate ancestral cultures are present in historic Haida, Tsimshian, and Tlingit areas. Croes's (1989b) analysis of basketry further indicates that the Tsimshian have many continuities with the Prince Rupert Harbour cultures of this stage.

PRELIMINARY EVALUATION OF EVOLUTIONARY MODELS

The evidence reviewed in the last two chapters shows that the Developed Northwest Coast Pattern stage was reached on the central coast about

2000 BP, and probably by about the same time on the north coast. How does this evidence relate to the theories of the origins of this pattern that we presented at the beginning of Chapter 6?

One of the oldest is the notion that Locarno Beach was derived, either directly or indirectly, from Eskaleut origins, and that the Developed Northwest Coast Pattern represented by Marpole resulted when interior people subsequently moved onto the coast. Locarno Beach is no longer the earliest coastal material on the central coast, and appears to have evolved out of the earlier St. Mungo–Mayne material. The notion that the Locarno Beach people relied on sea mammal hunting is clearly rejected. In fact, an analysis of the birds and mammals at the Pender Canal sites notes that "sea mammals were a minor part of the faunal assemblages" (D. Hanson, 1990:211). Explaining the development of the Marpole Culture by a migration from the interior is not plausible given the current information. Not only are there strong economic and technological continuities between Locarno Beach and Marpole, but there is no significant evidence for a population replacement.

Even older is the notion of Northwest Coast being originally a riverine culture, then a littoral, and finally a maritime culture (Kroeber, 1939:28–30). Modern evidence indicates that people have been on the coast and using coastal resources, at least seasonally, for a minimum of 8000 years. If salmon storage is equated with the riverine adaptation, then the archaeological sequence is apparently reversed, with a littoral adapted culture, relying on shore fish and shellfish, known prior (e.g., St. Mungo) to a riverine-adapted, stored-salmon one (Locarno Beach).

Burley (1979a, 1983) has proposed one of the most recent variants on Kroeber's riverine-to-coast theme. He hypothesizes that large-scale salmon processing and storage first occurred in such relatively inland places as the Fraser Canyon, and the Developed Northwest Coast Pattern occurred when either the technology, or people (Burley and Owens, 1987) moved to the coast. Specifically, Burley hypothesizes that this move created the Marpole phase in the Gulf of Georgia area. Current evidence indicates that salmon storage occurred on the coast prior to Marpole, by the beginning of the Locarno Beach phase. Furthermore, as Matson (1988b) has pointed out, interior housepit villages, almost universally interpreted as indicating salmon storage, do not occur widely before 3300 BP. Thus, there is no current evidence that salmon storage occurred on the interior rivers prior to the coast. The earliest known planked house village existing at the Paul Mason site, however, suggests that some aspects of this model may end up being verified.

Fladmark's (1975) model, that the Developed Northwest Coast Pattern occurred once the land–sea border had stabilized about 5000 BP, and allowed maximum salmon productivity, can no longer be maintained. This model, which has the existence of salmon productivity resulting in winter

villages and large-scale shellfish use, fails in a number of ways. Clearly, our review has indicated that the attributes of the Developed Northwest Coast Pattern do not occur all at once, with large-scale shellfish use occurring at times nearly 8000 years ago. Archaeological evidence indicates that large amounts of salmon were present early as well, as directly shown at the Dalles, and indirectly, at Milliken. On the other hand, winter villages can not be dated prior to 3200 years ago, and the Developed Northwest Coast Pattern as a whole, to only about 2000 BP. An essential part of this view was that the large shell middens appearing shortly after 5000 BP were also winter villages, something that cannot be maintained today, nor does Fladmark (pers. comm.) do so. In Chapter 4 we noted that recent work indicates that the sea level was within 15 m of the modern point by 9000 BP on the north coast, instead of the much larger differences thought earlier, indicating a longer period of relative sea–land stabilization. We are sure, though, that Fladmark could make a better case for "ecological causation," taking into account the absence of early winter villages and the other increases in knowledge that have occurred since he first proposed his idea.

Ames's proposal for development of the Northwest Coast Pattern has evolved over the years (Ames, 1979, 1983, 1985) but still centers on the need for hierarchical information processing (Ames, 1985:159–161). It appears to be a "necessity is the mother of invention" idea, dependent as it is on the existence of large, multifamily households prior to the development of the rest of the Developed Northwest Coast Pattern. (See also Croes and Hackenberger [1988:77] for a critique of the idea that large-scale salmon procurement requires a hierarchical organization.) Coupland (1988b) and Hayden (Hayden and Gargett, 1990; Hayden, 1992) have recently contrasted "functionalist" and "exploitative" models for the development of social complexity on a hunting-and-gathering base. These models are distinguished by different interpretations of the benefit of the elites to the society as a whole, with the "functionalist" believing that the development of elites offers important benefits to the rest of society. It is clear that Ames is working with the functionalist belief. Hayden started out as a functionalist, but in his inimitable manner, he undertook to test this assumption and found compelling evidence to reject it (Hayden and Gargett, 1990; Hayden, 1992). Accepting Hayden's findings results in largely rejecting the model put forward by Ames.

In addition, subsequent discoveries on the north coast (where Ames did his initial investigations) do not support his perspective. The early houses from the Paul Mason site are small, as are the purported Period II structures at Prince Rupert, too small to accommodate more than two families. His ideas would seem to demand evidence of multihouse economic organization (i.e., groups of these small houses, if they are to fit the current north coast evidence). The large houses associated with the Marpole phase would

make a better case, but they are associated with the fully Developed Northwest Coast Pattern and are not ancestral to it.

It is interesting that Brookfield (1984:27), in a study of agricultural intensification, found that social stratification follows changes in the economic system rather than precedes it. If "salmon intensification" (Matson, 1983) is analogous to agricultural intensification—and Matson claims it is—then we would expect social stratification to follow salmon intensification, which appears to be the case on the Northwest Coast. Note that this proposition not only casts doubt on Ames's scheme, but also on Matson's (1983:142). There he posited that large-scale salmon use would co-occur with ascribed status and sedentariness. Even in agriculture, though, the situation is not always clear "and what is cause and what is consequence are often obscure" (Brookfield, 1984:27).

Croes and Hackenberger's (1988) important economic modeling points not only to the importance of a storage economy, but also to the idea (and to supporting evidence) that clear social ranking evolved after the storage economy was in place. Their contrast of storage and prestorage economies, and their positioning Locarno Beach at the initiation of the storage economy is also supported by independent empirical evidence. Perhaps of greatest significance is their argument that prior to the storage economy, one had a broadscale subsistence adaptation, with shellfish as an important limiting factor during the winter. This interpretation of the prestorage, pre-Locarno Beach economy is equivalent to Frederick's model of St. Mungo, and compatible with Matson's (1976, 1981) view of the St. Mungo component at Glenrose. Using somewhat different terms, Lyman (1991), following Binford (1980), has contrasted "Forager" and "Collector" adaptations, with the St. Mungo-like south coast cultures being "Foragers," and the specialized salmon adaptation as an example of the "Collectors." To a large degree, the evidence reviewed in the previous chapters supports this interpretation.

The importance of the storage economy is underscored by Croes and Hackenberger's model, which indicates that the Hoko River area could support a winter population six times greater than that of the prestorage economy. This factor would explain the rapid spread of this adaptation throughout Wissler's "Salmon Area," as apparently happened. Although we have not seen other demonstrations that this six times factor is true elsewhere, we assume that some such factor is.

There are, however, two aspects of Croes and Hackenberger's model that have yet to be demonstrated. First, they argue that flatfish were the first stored fish, and that salmon were added later. No evidence could be found at the Crescent Beach site to support this idea, although Matson *et al.* (1991) tried. At Crescent Beach the flatfish remains were starry flounder, which are much smaller than the halibut sometimes found elsewhere, in-

cluding Hoko River, where Croes (1992b) does present evidence that halibut may have been stored. There is, then, no convincing evidence that a widespread presalmon, flatfish-storage stage occurred. The analytical technology, though, is just beginning to be developed to the stage where it can be applied fruitfully to this question (Croes, 1992b). Since whether or not stored flatfish use occurred widely prior to large-scale salmon storage is just beginning to be investigated, this question must remain open for now.

Second, Croes and Hackenberger (1988) support the arguments made by Mitchell (1971b:52), Matson (1983:143), and Ham (1982), that Marpole is likely the peak time of dependence on salmon. Although Matson (1989) and Burley (1980) demonstrate that the Old Musqueam subphase Marpole components are concentrated around the Fraser delta, convincing support for this idea remains to be found.

We might note that the 1983 version of Matson's model has had one aspect resoundingly rejected. That is the idea that large-scale salmon use must be temporally tied to sedentariness and ascribed status. Not only is this idea suspect on general observations of intensification in agriculture as cited above, but Matson's work at the Crescent Beach site (Matson *et al.*, 1991) and his more general review (Matson, 1992) find large-scale salmon storage occurs first in the Locarno Beach phase, which explicitly falsifies his model (Matson, 1983:144). Now this seems all too obvious. At this time we beg off the dubious honor of further evaluating our own ideas. We will, however, turn to them briefly in a later chapter.

Having outlined the ideas about processes resulting in the achievement of the Developed Northwest Coast Pattern, and the evidence for these processes, the primary goal of this volume has been reached. Developments still continue to take place on the Northwest Coast, though, and that is what we cover in Chapter 8. Most interesting is the relationship between the ethnographic and the prehistoric material records. In the archaeology of the last 1500 years this relationship can be explored—where the archaeological material can be illuminated directly from the ethnographic record.

8

Continuation of the Developed Northwest Coast Pattern

* * *

INTRODUCTION

By about 1500 years ago, the Developed Northwest Coast Pattern was present from the northern California coast to Yakutat Bay in Alaska. Almost everywhere, this stage appears to be a continuation of the previous one and blends into the ethnographic period. It is the easiest to interpret, given the abundant ethnographic records. In spite of these advantages, as well as the large number of sites excavated with components that date to the last 1500 years, there are still some outstanding questions.

In many ways this period is best known outside the Gulf of Georgia area. This may be in part because of the large house sizes in the Gulf of Georgia, which are very difficult to uncover completely. In any event two of the most important investigations are found at the extreme ends of the Northwest

Coast where smaller houses are found. We begin at the southern end, at the Point St. George site, originally the dissertation research of Richard Gould.

THE SOUTHERN COAST

Point St. George

The Point St. George site, located just north of Crescent City in northern California (Figure 8-1), was an ethnographic Tolowa winter village. The Tolowa are Pacific Coast Athapaskan speakers, and so were probably only in this area in the last 1000 or so years. This inference is based on the relative homogeneity within this subgroup of the Athapaskan language family (Thompson and Kinkade, 1990:30–31) and on the amount of language differences between this subgroup and other Canadian Athapaskan groups (Dyen and Aberle, 1974:11–14). This area is rich in subsistence resources: oak groves, and thus acorns, chinook and coho salmon, eels from the nearby Smith River, as well as a number of bird and sea mammal rookeries on the offshore rocks. As one might expect from his later work (Gould, 1980), Gould worked extensively with Tolowa informants, resulting in much additional information, although he referred at that time to this activity as being part of the direct historical approach (Gould, 1966). As reviewed in the sidebar, informant testimony allowed Gould to investigate different functional parts of the site and to discover the remains of a house. This house consisted of a square pit about 3 m on a site, with vertical plank walls from 1 to 2 m outside of the pit (Figure 8-2). Houses at Point St. George were placed immediately in front of the midden, with a rough work area located some 400 m away to the north of the houses.

Tolowa informants enabled Richard Gould to discover sites and to understand features of the Point St. George site. This village site was found to consist of four separate parts, a cemetery located some ways away from the village, a stoneworking, butchering area some 400 m from the houses, the houses themselves, and immediately behind them, the midden. Gould would not have found the houses without informant testimony, as they told him that the shell midden he was excavating was the garbage, and that he would find the houses seaward from there, on a steep slope, and such was the case. Many details of the house (Figure 8-2)—how it was built, and the presence of features such as the existence of a "climbing out rock" at the entrance—were discovered with the aid of informants, even though this site was abandoned before the time of the informants' grandparents.

The house was built of vertical redwood planks, without a separate frame, and was gabled in two directions. Houses were orientated east–west

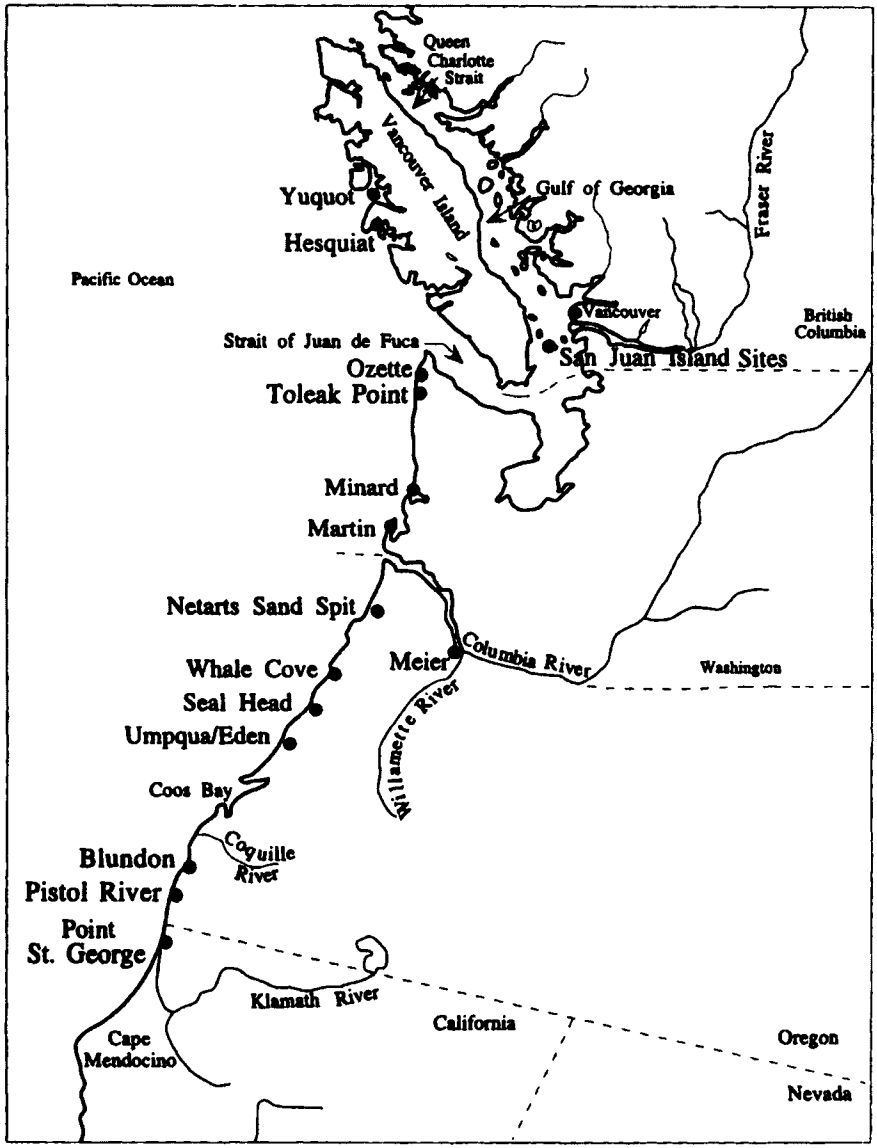


FIGURE 8-1 South coast late (1500–150 BP) sites.

to properly make use of the prevalent north wind for ventilation and fire draft. Tolowa informants also insisted on a spring being adjacent to the houses, and after searching one was found, although changed by recent land modifications.

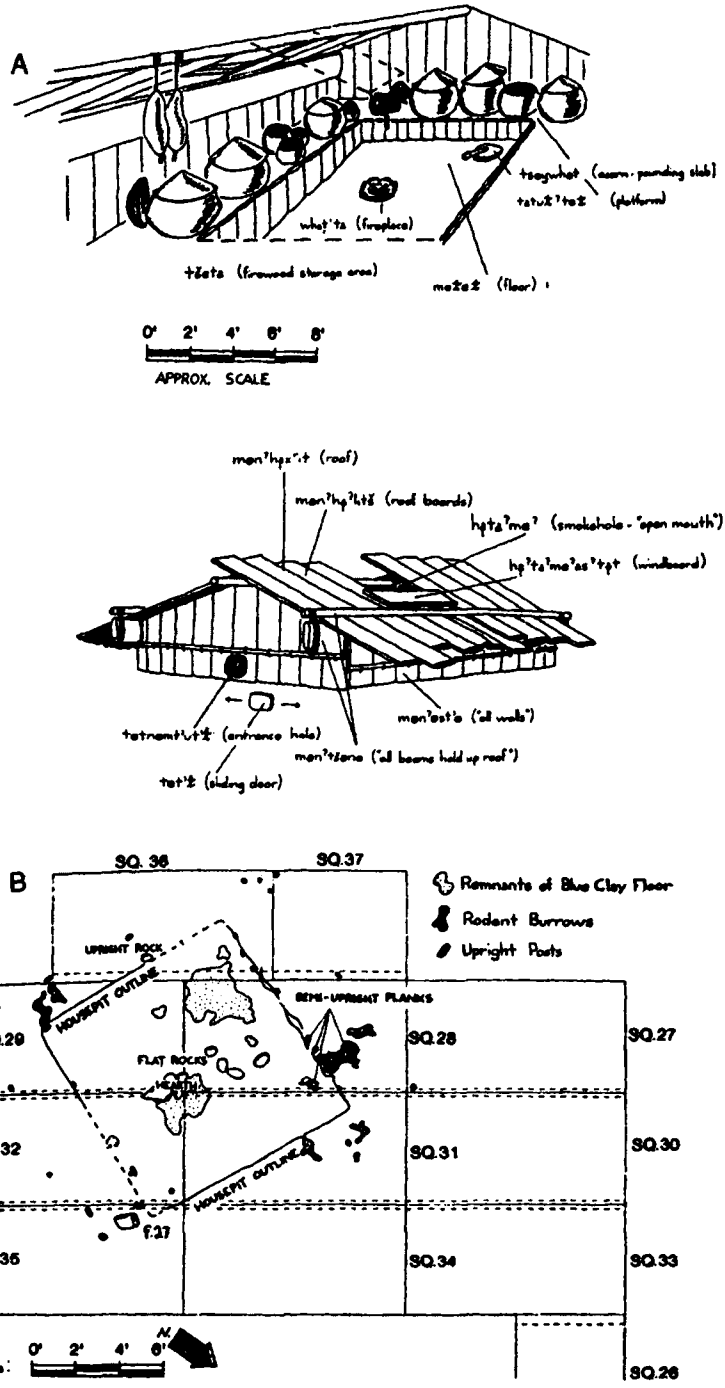


FIGURE 8-2 Point St. George site house (A) ethnographic reconstruction. (B) archaeological feature. (From Gould, 1966.)

The location of this site, on a rise without trees, was said to be selected in order to give warning of enemies in times of conflict, which were believed to be frequent. The "workshop area" was found not only to have the features specified by the informants, but also to have a pit surrounded by a windbreak (inferred from postholes), indicating long-term use.

The informants also made inferences about the function of tools recovered, including which projectile points were arrow points and which were arming tips for harpoons (Figure 8-3). The style of harpoon used, unilateral barbs with frequent bilateral line guards, is reminiscent of the "Marpole-style" harpoon, except for the slot for the arming blade in the tip. This harpoon style is probably used for procuring sea-lion-sized animals. Steller sea lions are the main sea mammal remains found in the midden, and a rookery is present off Point St. George today. Three separate styles of chipped stone projectile points were recovered (Figure 8-3); the small Gunther Island barbed arrow points, the small hollow based arrow points, and the large hollow based harpoon arming blades. These three functional classes were specified by informants.

Among the ground stone artifacts are stone adze handles for California mussel shell adze blades and pestles for acorn processing (Figure 8-3). Notched stone net sinkers were also found in some numbers, but only three small pieces of ground slate and three pieces of stone pipe bowls were recovered. A variety of bone fishhooks, antler wedges, bone needles, and bone unipoints and bipoints were recovered. All these items are similar to ethnographic items and were recognized by informants.

Among ornamental items, only two beads, one of clam shell, and one *dentalium*, were found. In addition, a bone nose plug was also found. These were used ethnographically as status markers. Although no direct evidence was found of the large obsidian blades used as wealth objects along the south coast, Gould notes that he did not excavate in the cemetery, where one would expect to find them, and that an informant claimed that his family was part of an obsidian trade network that reached all the way to central Oregon, near Bend, where large pieces of obsidian can be obtained.

Gould's 1966 report gives an idea of what can be done using an ethnoarchaeological approach with a recent site not only to identify and interpret the features and artifacts recovered, but also to place sites into a regional settlement system. He was able to use informant testimony to fill out the subsistence pattern, and also to locate the sites used for the various resource extractive activities. As indicated in the sidebar, at Point St. George the most common mammal remains were Steller sea lions, probably obtained locally, although deer and elk remains were also present. Remains of rocky foreshore and sandy beach-dwelling shellfish were also recovered; both are present today at, or near, Point St. George. Numerous cormorant remains are reported, and today cormorants are found on the rocks offshore. Gould (1966:84) suggests that cormorants were mostly obtained as fledglings in June and July. The fish remains from the midden include a variety of

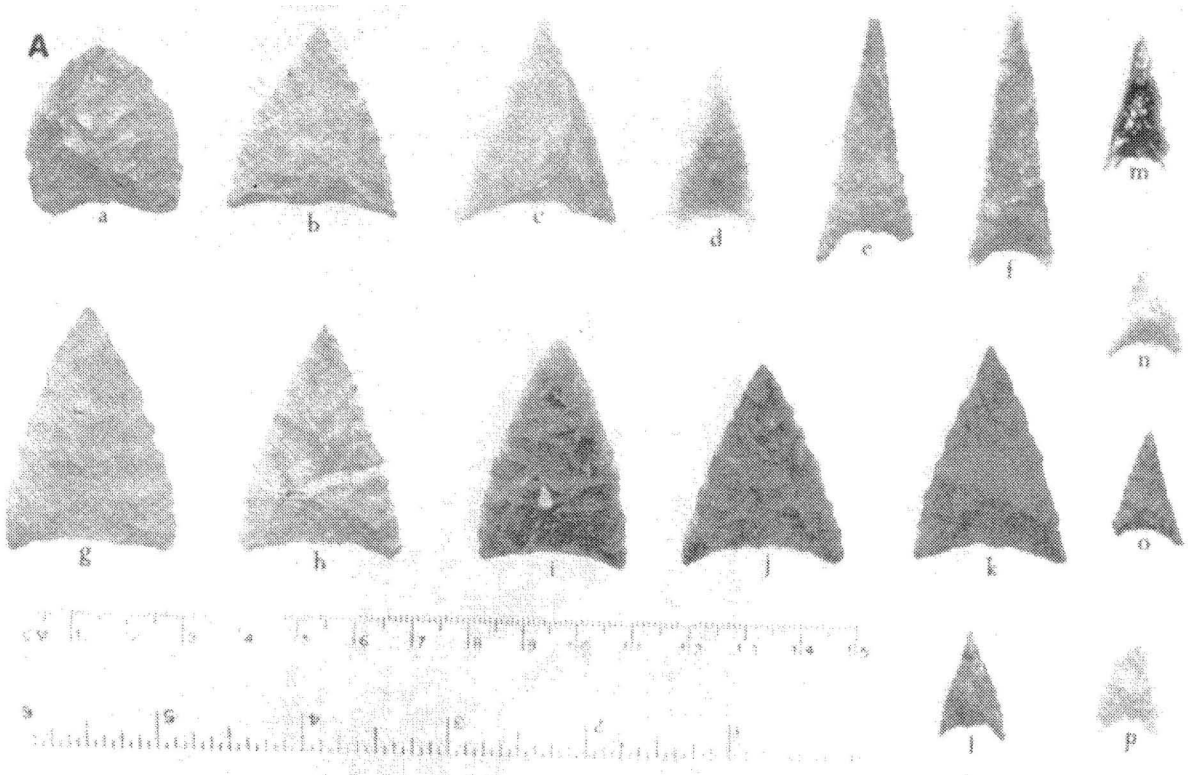


FIGURE 8-3 Point St. George artifacts. (A) (a–d, g–k) chipped stone harpoon blades; (e–f, l–p) arrow points. (B) (a) paint grinder(?), (b) probable palette, (c–e) hematite. (C) Unilaterally barbed harpoons. (D) Ground stone adze handles. (E) (a) possible "eel splitter;" (b–e, g, i–l) tule mat needles, (f, h) awl. (From Gould, 1966.)

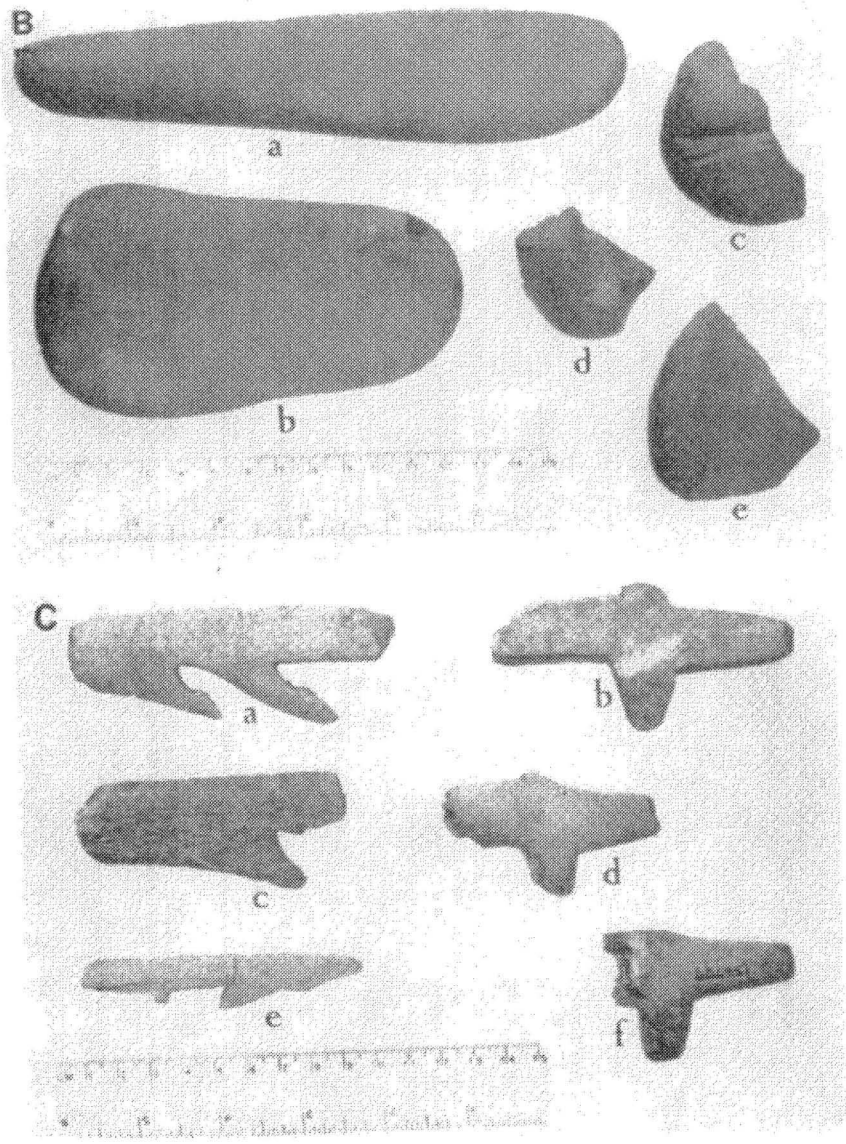


FIGURE 8-3 (*Continued*)

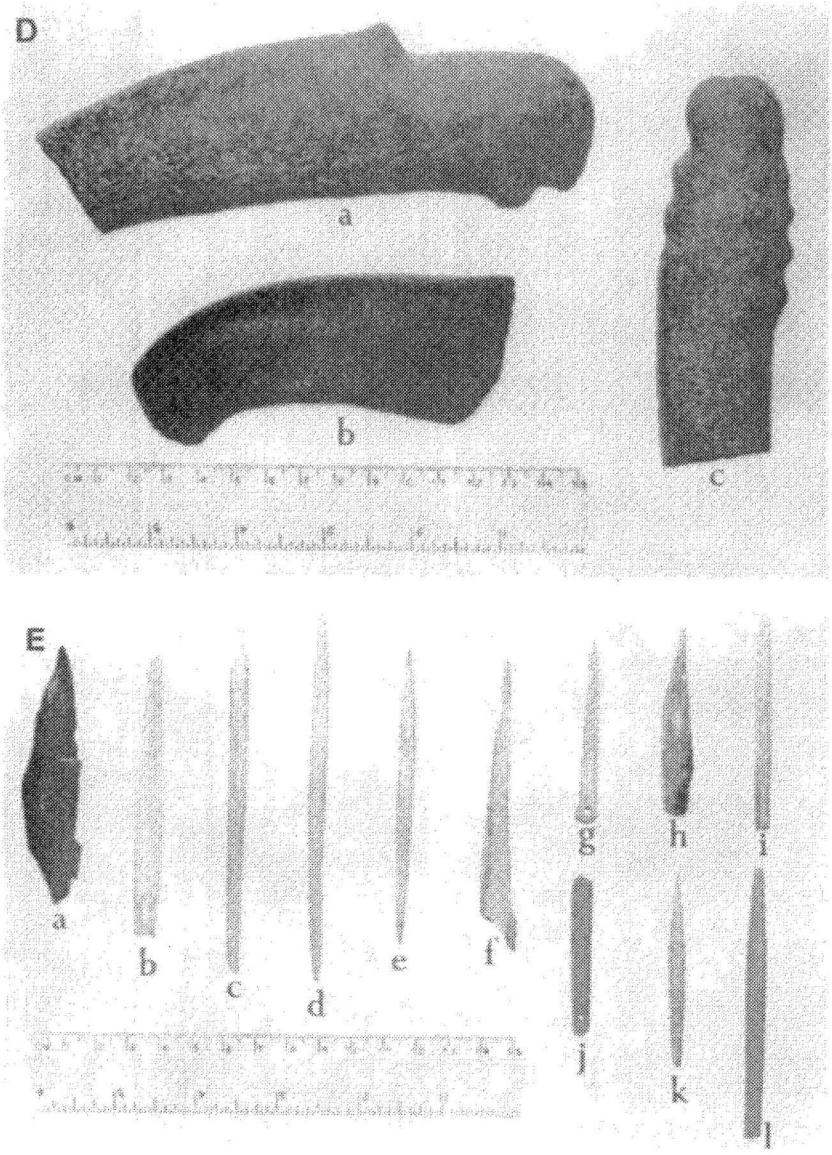


FIGURE 8-3 (*Continued*)

species, but rockfish (*Sebastes* spp.) of a number of types are the most abundant. Also present in some numbers are cabezon and Pacific halibut. This fish spectrum may be somewhat misleading, as most of the excavation ma-

terial was not screened, so fish usually represented by smaller vertebrae without spines, such as salmon, may be underrepresented.

According to informant testimony, the winter village was occupied from the end of November until late summer. It was the first months of this period, during the rainy season, when dances and indoor ceremonies took place. In the early spring, some individuals and families left to procure salmon and eels along the Smith River, but not for long. The first whole-scale movement from the village was to obtain surf smelt when they began to run in August along the beaches some 5–15 km north of the village. The smelt were obtained with large V-shaped nets. The smelt would be dried at camps in lee of beach dunes and transported back to the village. After the smelt run ended, the village inhabitants would move inland to oak groves in order to collect acorns. This inland location is near good fishing spots along the Smith River. A later move would be made to these spots where chinook and coho salmon would be caught using weirs and harpoons. None of the limited-activity sites was more than 20 km from the village, so that transporting processed resources over land was feasible. Gould (1966) was able to locate archaeological sites in some of these resource locations with the help of informants.

All in all, Gould's work is a most impressive web of archaeological and ethnographic investigations, similar to F. de Laguna's (1960) Tlingit research at the far north end of the Northwest Coast, reviewed later in this chapter. The use of archaeological and ethnographic inquiry techniques together results in something more than additive knowledge. The settlement system of a complex winter village base camp—with either three or four separate functional locations—and the specialized resource collecting and processing sites contrast greatly with the assemblages first associated with a coastal adaptation; surely the former are an example of the specialized collector strategy noted by Lyman (1991).

Oregon Coast

In many ways, the pattern elucidated by Gould (1966) for northern California is repeated along the Oregon Coast, although never as clearly and as completely. Draper (1988) reports on 14 investigated sites that we judge can be placed into this class, either by the presence of arrow points (or arrow points being more abundant than atlatl points) or radiocarbon dates. Of these Draper (1988:343) classifies eight as residential sites, mainly on the basis of excavated house remains or housepits noted on the surface. The largest of these is the Pistol River site (Figure 8-1), which is reported to have 40 housepits, although some of these may be historic.

Of the six sites classified by Draper (1988) as non- residential, four are located along the Coquille River or its forks, and another, the Ross site, has remains of what are interpreted as fish-drying racks. Two of the four sites

along the Coquille system have weirs noted either on the sites or adjacent to them. These four Coquille fishing sites are found throughout the river system, from the estuary, the end of tidewater, and to 40 km inland. The sole nonresidential site (Blundon) not on the river, or associated with fish-drying racks, is apparently a coastal resource procurement location with access to sea mammals, birds, and marine fish. This southern Oregon coast site distribution certainly validates the "collecting" pattern indicated by the ethnography, and reflects the importance of salmon Baumhoff (1963) demonstrated for neighboring parts of California.

Most of the artifact types reported by Gould (1966) are present in these sites but there are some significant differences. Stone adze blades are reported at a number of sites, as are mortars, neither of which were reported by Gould, although he did report pestles. The mortars and pestles are used to process acorns. Abrasive stones are also relatively abundant; it may be that their presence was overlooked at the Point St. George site. Aboriginal clay pipe fragments are also present at a number of sites, as well as composite toggling harpoon valves.

At least one site, Port Orford (Draper, 1988:133–178), is interpreted as having separate workshop and living areas much like that of the Point St. George site. According to ethnographic accounts, the separation of the cemetery from other parts of the winter village complex is limited to Athapaskan groups on the south coast. Accordingly, late sites outside of Athapaskan areas would not be expected to have separate cemetery sites. Still, the information from the Point St. George site appears to be significantly better than from late prehistoric sites in Oregon.

Draper (1988) reports numerous structural remains from the eight residential sites, although no single house feature is as well described as that by Gould (1966). From Bullard's Beach, Draper (1988) reports house features with dimensions of 4 × 5 m; from Pistol River, one, 3.5 × 7.2 m; from Cape Arago one housepit 4.3 m wide and uncertain length. These dimensions are small, but we are uncertain whether these are the dimensions of the central pits or the full dimensions of the houses. If we assume the measured features are only central pits and if we add 2 m to each of these measurements to account for the surrounding benches, the size of the most common feature (4 × 5 m) becomes 6 × 7 m, or 42 sq. m. In any event they appear to be small, the size for a single nuclear family, and not the size reported for wealthy households, which, according to the ethnographies and informant testimony, housed at least multiple spouses and unmarried relatives (e.g., Seaburg and Miller, 1990). Thus, there appears a clear difference archaeologically between this south coast material and the central and north coast. Given the problems of recognizing large houses when excavating with the usual 2 × 2 m or less sized units, though, there might be a tendency to recognize small houses out of proportion to their actual occurrence in the past.

Further north on the Oregon coast, three recent prehistoric sites have been reported by Lyman (1991) and Bennett (1988). Umpqua/Eden (35DO83) is a site located in the tidal estuary of the Umpqua River that has been excavated several times, although Lyman (1991) focuses his analysis on the excavations carried out by Ross in 1978, 1979, and 1980. This large assemblage is dominated by a component dated between 1000 and 200 BP (UEIII in Lyman, 1991:114–115). Both the stemmed Gunther Island and the hollow (concave base) forms of arrow points are present. Only modest numbers of notched sinkers and abraders are recorded, along with three adze blades. Obsidian, including one large biface and fragments from other large bifaces, is also noted. Lyman (1991:118) interprets the large obsidian biface and biface fragments as examples of the wealth items reported in ethnographies. A number of nondescript clay balls and four clay pipe fragments are present. Numerous fishhooks (55) and lesser numbers of bone points were also recovered, along with both unilaterally barbed and composite harpoon valves. Only five decorated bone pieces are noted.

Lyman (1991) reports on two small (8 and 12 sq. m) prehistoric house floors. One wonders if these are really the central pits of somewhat larger houses. Still, there are apparently no clearly prehistoric large houses currently known south of the northern Oregon coast. A large (estimated 8 × 30 m) proto-historic/historic house feature, however, estimated to date ca. AD 1700–1850 is present at this site.

Only the mammalian fauna are fully reported and consist of elk (dominant) and deer among the land mammals, and large numbers of sea otters, harbor seals, and lesser numbers of Steller sea lions and northern fur seals. These resources are consistent for the last 1500 years or so. Even though they are not reported in detail we can expect salmon and other fish to have been more important than the sea and land mammals, given the location of this site and the presence of residential structures.

Further north along the coast (Figure 8-1), Lyman (1991) and Clark (1991) report on Seal Rock, almost certainly a summer coastal limited-activity site. Here sea mammals outnumber land mammals two to one. This single-component site is dated to the last 400 years by two radiocarbon dates, in spite of the deposit having a maximum depth of 1.5 m. The projectile points consist of three main classes, large triangular points, inferred to be harpoon arming blades, Gunther Island and concave base style arrow points. Only nine abraders and two pestles were recovered in contrast to the 51 projectile points present. In the bone and antler class, an amazing total of 68 wedges or chisels were recovered, and 41 various bipoints or unipointed bone artifacts. A total of 21 composite harpoon valves were found, along with 22 triangular inferred harpoon arming blades for composite toggling harpoons. Only four fishhook pieces were recovered, in contrast with the nine ornamental pieces of bone, which appear to be mostly perforated pendants (Clark, 1991:213).

Among the mammal remains, the large Steller sea lions dominate the assemblage. In contrast with the staggering numbers of Steller sea lion remains (the number of identified elements, or NISP, is 984), the number of fish remains sampled is modest. The total number of identified fish is only 583, with only six of those salmon or trout! No analysis of shellfish is available. Of the fish remains, 182 are attributed to the perches, 75 to rockfish (*Sebastes* spp.), 156 to greenling and lingcod, 54 to sculpin, and 25 to cabezon, with the remaining 95 to flatfish, starry flounder, and Petrale sole (*Eopsetta jordani*).

Except for the flatfish, these remains are what would be expected to result from summertime fishing on the local rocky reefs. The absence of salmon, to us, makes it very unlikely that there was a significant winter occupation here. The seasonality of deer based on stage of epiphyseal fusion support an inference of summer use, as does the presence of harbor seal (and fur seal) newborns and the age distribution of the Steller sea lions remains. Lyman (1991) presents some evidence based on deer and elk dentition that some winter occupation also occurred, but our experience is that dentition is an inferior way of estimating seasonality. So, in sum, Seal Rock is clearly a specialized sea lion procurement site and, in our view, most likely occupied only during the summer.

Whale Cove, located further north on the Oregon coast (Figure 8-1) is a very similar site, but one whose inhabitants concentrated on procuring harbor seals (Bennett, 1988; Bennett and Lyman, 1991). In Whale Cove II and III, which date to 600–300 BP, a much restricted artifact inventory is present compared to the earlier Whale Cove I, reported in Chapter 5. Five projectile points are present, all arrow points, including the Gunther Island form, three utilized flakes, one uniface, two other bifaces, three utilized cobbles, and two abraders (Bennett, 1988). This sparse lithic industry is matched by a small bone and antler industry, which has a single bone unipoint, two bird bone needle fragments, two antler wedges, and a single worked sea mammal bone. In addition, seven fragments of a large obsidian "wealth" blade probably date to this component.

Faunal remains included NISP numbers of 10 deer, 7 elk, 3 Steller sea lion, 67 harbor seal, and 3 sea otter (Bennett, 1988:23). Slightly different numbers are reported by Lyman and Bennett (1991). The presence of newborn harbor seal remains points to a spring–summer use. The emphasis on harbor seals is sufficiently clear. The shellfish are apparently whole California mussel, in contrast to the crushed bay (Bennett, 1988) or California mussel (Lyman and Bennett, 1991) found in the earlier Whale Cove I. In addition to Whale Cove and Seal Rock, Bennett (1988:8–9) refers to two other Oregon coast sites that also have evidence of intense seasonal exploitation of coastal resources, the Neptune site and Cape Perpetua, both dating to the last 1500 years.

Seal Rock and Whale Cove are two good examples of late, specialized procurement components located some distance from winter village sites. Bennett reports on two other similar specialized sites, indicating that this is a widespread pattern, and one that agrees with the ethnographic pattern of specialized procurement sites located away from the winter village. Whale Cove is particularly interesting, as it has components both of this adaptation, and the earlier, broadscale, long-duration occupation typical of the earlier adaptation to the coast.

The site at Netarts Sand Spit (T. M. Newman, 1959) and a nearby site summarized by Lyman (1991:127) on the northern Oregon coast (Figure 8-1) demonstrate the presence of winter villages with large houses. The Netarts site was investigated by the University of Oregon in 1956, 1957, and 1958. T. M. Newman (1959) reports on three houses, one 4.5 × 16 m, one 4.6 × 17.5 m, and one 5 × 12 m (Figure 8-4). The first two appear to be prehistoric but dating within the last 600 years according to three radiocarbon dates, whereas the last one contained trade goods, indicating that it was occupied in early historic times. These large house features (Figure 8-4) included numerous hearths, postmolds, and even pieces of cedar planks, and were excavated into the ground surface. Clearly, these are multihousehold structures, and this site has surface evidence of a total of 13 houses.

Two other houses were investigated at the nearby site, 35T14, according to Lyman (1991:127). This site is said to have at least nine remains of houses, and the two investigated are 8 × 17 m and 10 × 18 m. These structures must have been occupied by large multifamily households and are reported to date within the last 250 years (Lyman, 1991:127). The Netarts site was excavated nearly 40 years ago, limiting the range and kind of information available—no artifact counts—and no significant report is currently available for the other, more recently excavated site.

It is interesting that the large houses found along the Oregon coast are in the north, and date to the last few hundred years, with the exception of the Palmrose site at Seaside reported in the last chapter. Given the general later—and less intense—development of the Northwest Coast Pattern along the southern Northwest Coast, are we to infer that the multifamily households are a relatively late development and were still spreading south? It is an idea that should be kept in mind. It may be that the fully Developed Northwest Coast Pattern was spreading down the Oregon coast when it was truncated by extensive contact with Europeans.

One of the largest houses yet investigated on the Northwest Coast is at the Meier site (Figure 8-1), near Portland on the Columbia River, 150 km upstream from the Pacific Ocean. This house, approximately 14 x 35 m, is in Chinookan territory and was probably occupied for a very long duration (Ames *et al.*, 1992). It is estimated to date from about 550–150 BP

(AD 1400–1800), as a few European trade goods are present, and is described in more detail in the sidebar.

Excavation revealed what appear to be three different functional areas in the Meier site house cross-section: the bench underneath assumed wooden sleeping platforms along the outer walls, the corridor (the space between the bench and the central zone), and the central zone, which contains the hearths and ridge support timbers (Figure 8-5). The bench is from 2–2.5 m wide, with small postholes and plank molds. The corridor is a very complicated area, filled with the remains of numerous reused pits averaging 1.0 m in depth and 0.86 m in diameter. Ames et al., (1992) indicated these were reused and reexcavated many times, resulting in a

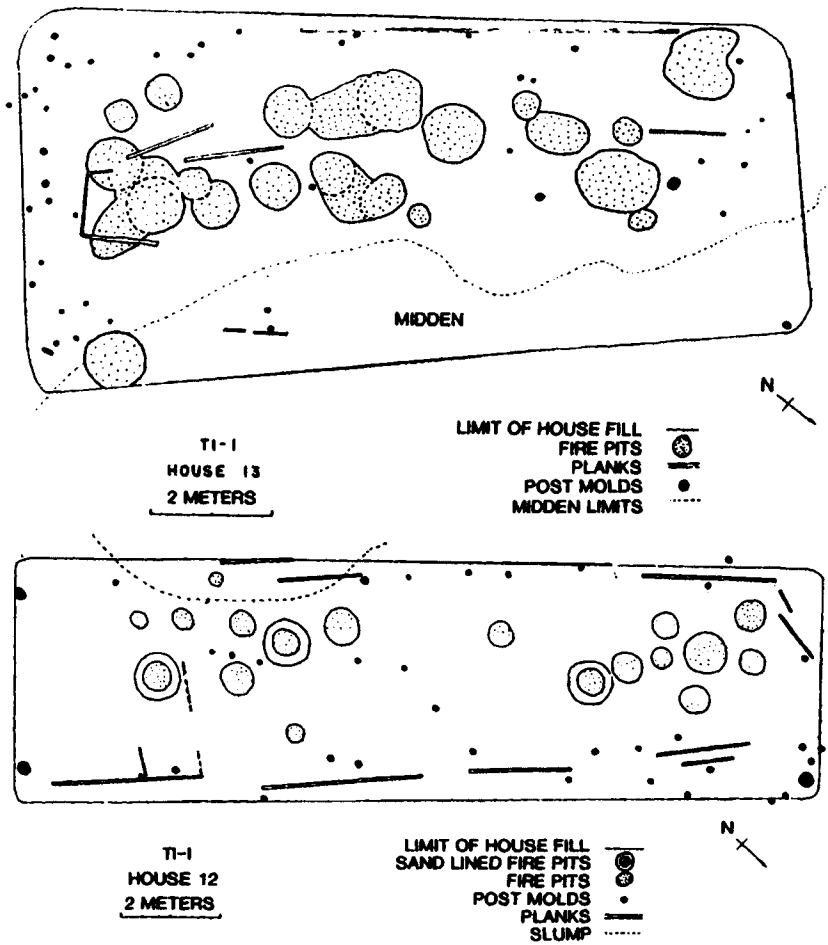


FIGURE 8-4 Netarts Sand Spit houses 12 and 13. (From T. M. Newman, 1959.)

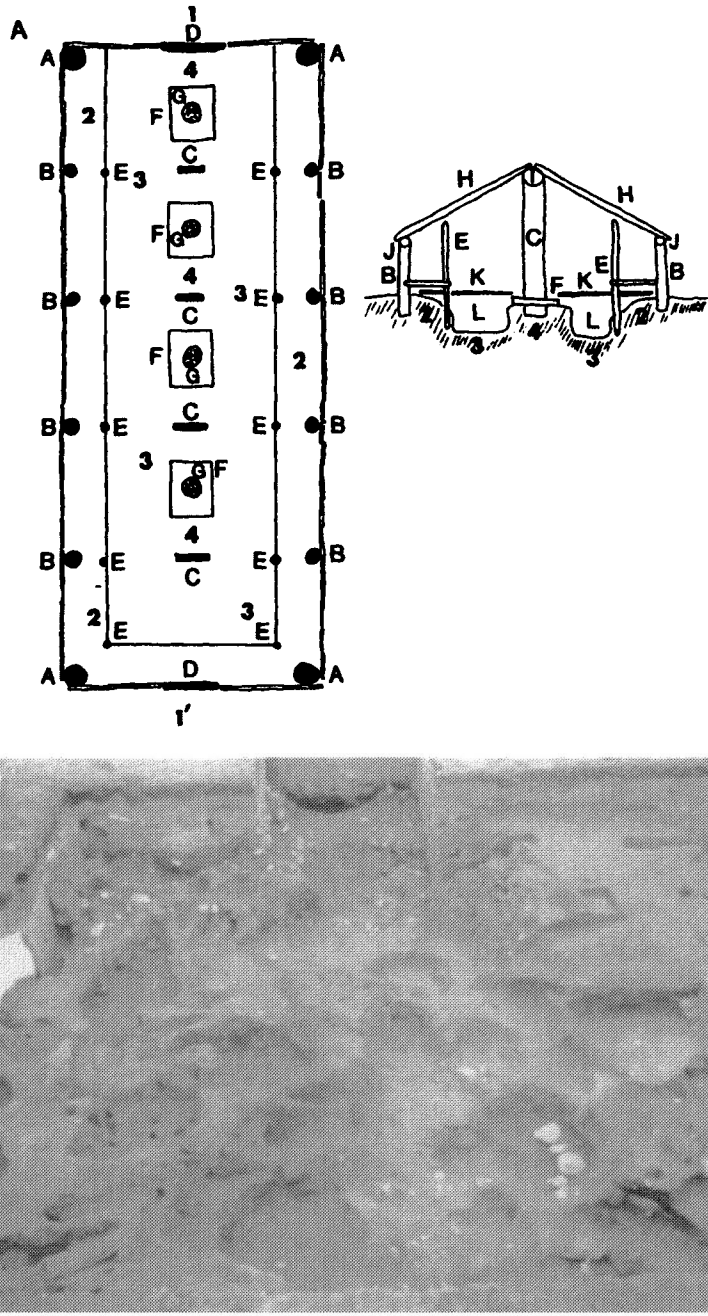


FIGURE 8-5 Meier site house. (A) Reconstruction, plan view and cross section. (B) Photograph of sub-floor features. Note post molds in lower left-hand corner. (From Ames *et al.*, 1992.)

> very complicated stratigraphy. They were often filled with refuse, including fire-cracked rock. Many pits had reinforced rims.
>
> The central zone contained rectangular hearth boxes, ridge support timbers, and the areas in between these two kinds of features. The fires were built on shallow clay bowls, which were contained within large rectangular boxes from 1–2 m in size. The ridge support timbers were placed in holes, some of which showed evidence of being remodeled from 5 to 10 times. This evidence suggests that the house was completely rebuilt a number of times, indicating a long occupation, probably several hundred years. Similarly, hearths indicated multiple remodeling episodes.

The Meier site house provides convincing evidence of a long-duration multifamily household. Up to 60 people—obviously, a large, complex corporate group—inhabited this massive structure, and rebuilt it a number of times. Historically the Chinooks were one of the groups with the largest percentage of slaves (Mitchell, 1985). Thus it does not take much imagination to populate this structure with nobles, commoners, and slaves, with each class occupying particular places in the house.

THE CENTRAL COAST

The Outer Washington Coast

Our knowledge of this period on the Pacific coast of Washington has been relatively stable over the last twenty years, unlike the Pacific coast of Oregon. Four village sites have long been reported (Figure 8-1): the Martin site, Minard site, Toleak Point, and White Rock Village (T. S. Newman, 1959; Guinn, 1962, 1963; Kidd, 1967; Roll, 1974; Shaw, 1977). In addition, information is rapidly accumulating on the more recently excavated Ozette site, buried by a mud slide in the mid-eighteenth century.

Both the Martin and the Minard sites are located on dunes between a bay and the open ocean. The Martin site is in Willapa Bay, in historic Chinook territory, and Minard is in Grays Harbor, in Salish territory (Figure 8-1). The Martin site may date to the end of the previous period, as Shaw (1977) reported a radiocarbon date of 1400 BP on the main component. Kidd (1967) described some features at the Martin site that may be part of a house structure, and Shaw (1977:21–23) reported on what appeared to be the corner of a planked structure built in a pit. Along with barbed bone points and bone unipoints (Table 8-1), a number of bone "wedges" (Kidd, 1967:38), similar to the bone "wedges/fleshers" found in an earlier time in the Gulf of Georgia are found. Fauna recovered included deer, elk, beaver, harbor seals, and sea otter, and some unidentified whale. Native oysters (*Ostrea lurida*) were the most important shellfish, followed by *Clinocardium*. Fish and bird bones were present but not further identified.

The Minard site is located in almost an identical setting on the spit that protects Grays Harbor (Figure 8-1). This site is in historic Salish territory and is very similar to the Martin site, although with more ground stone and less chipped stone tools (Roll, 1974). Seven burials were also recovered. A number of postmolds, but no definite house structures were found. This site has three radiocarbon dates, all within the last 1000 years (Roll, 1974).

Toleak Point is located on a point further north, 40 km south of Ozette, without access to a bay. It has an assemblage that is relatively similar in age to the previous two sites (T. S. Newman, 1959). White Rock Village (Guinn, 1962, 1963; Roll, 1974), is a late site with a radiocarbon date to the last 400

TABLE 8-1 Washington Pacific Coast Sites*

Artifact class	Minard (%)	Martin (%)	White Rock Village (%)	Toleak Point (%)
Projectile points (chipped stone)	4.5	29.3	0	0
Girdled sinkers	0.5	0.6	1.8	2.8
Composite harp. valves	7.1	0	5.9	1.9
Unbarbed bone/antler bipoints	17.0	3.1	1.2	0.9
Harpoon foreshafts (?)	0.4	0	0	0
Herring rake teeth (fishhook barbs?)	0.4	0	18.7	26.0
Bone projectile points	2.0	1.2	0	0.9
Carved bone fishhooks	0.5	0	0	0
Bifacial knife frag.	0.5	7.9	0	0
Misc. scrapers (?)	0.2	15.2	0	0
Modified flakes	2.4	3.7	0	0
Cobble choppers	1.6	1.8	0	5.6
Ground stone clubs	0.9	0	0.6	0
Ground stone adze blade	0.2	0	0	0
Ground slate knife	0.2	0	0.6	0
Hammerstones	0.5	4.9	1.8	6.5
Abrasive stones	10.3	7.3	8.2	13.9
Needles	3.6	0	0.6	1.9
Wedges/chisels/punches	17.0	16.5	17.5	4.6
Awls	22.5	2.4	40.4	22.2
Ulna tools	1.1	3.1	0	0
Beaver incisors	2.5	0.6	0	0
Antler tools, (uncertain id.)	1.1	0	0.6	0
Bored antler beams	0.9	0	0	0
Sea mussel tools	0.9	0.6	1.2	0
Beaver incisor gaming pieces	0.5	0	0	0.9
Drills	0	1.8	0	0
Ground shell projectile points	0	0	1.2	0
Ground stone fishhook shanks	0	0	0	12.0
Total artifacts	551	164	171	108

*After Roll, 1974.

years, located 2 km south of the Ozette site. The recovered assemblage from White Rock Village is probably very similar to the imperishable remains from Ozette.

There is a surprising amount of artifact variability among these sites, considering all four date to the same time period (with the possible exception of the Martin site) and are all located in a 170 km stretch of the Washington Pacific coast. Differences between the four assemblages (Table 8-1) include much more chipped stone at Martin and many more bipoints at Minard. Herring rake teeth or fishhook barbs are much more common at White Rock Village and Toleak Point than elsewhere. Ground stone fishhooks are found only at Toleak Point. Perhaps most interesting is the amount of difference between the neighboring Minard and Martin sites, located in very similar situations. Roll (1974) suggests this is the result of ethnic differences between the Salishan Minard and Chinookan Martin sites. According to this perspective, the abundance of chipped stone at the Martin site may be the result of the probable Chinookan ethnicity of the inhabitants. Chinook territory as a whole has a more inland orientation and inhabitants would be expected to use more chipped stone. On the other hand, the increased chipped stone may result from the Martin site's older age. The Minard site assemblage is actually more similar to the White Rock and Toleak Point sites than to the geographically closer and more similarly situated Martin site (Roll, 1974:270). It is less surprising that the similarly situated and close geographically White Rock and Toleak Point sites are the most alike pair.

There is no complete faunal analysis for any of these four sites, making it difficult to investigate the variability described above. One would expect that more open-ocean resources would be found at the most northern pair and the most salmon at the southernmost Martin site, because currently more salmon resources are present in the south. Furthermore, the seasonalities of these sites are unknown. All are most likely winter village sites, although only White Rock Village has that formal designation. Toleak Point is the location of at least one historic house, and three inferred prehistoric houses (T. S. Newman, 1959:91), whereas the Minard site's seven burials and numerous post-mold features make it a likely winter village as well.

In addition to these four presumed winter village sites, information is slowly accumulating about the famous Ozette site (Figure 8-6). In spite of many statements to the contrary (e.g., Wessen, 1990), the main excavated component is very recent, dated by dendrochronology to the mid-eighteenth century (Samuels, 1983), and thus is probably best thought of as "proto-historic." The material is likely equivalent to that reported by the first explorers to the Northwest Coast, which explains the presence of such items as iron blades, and allows for detailed comparisons with the ethnographic record as discussed in the Sidebar. At Ozette, mud slides allowed the preservation of usually perishable remains in the water-logged deposits

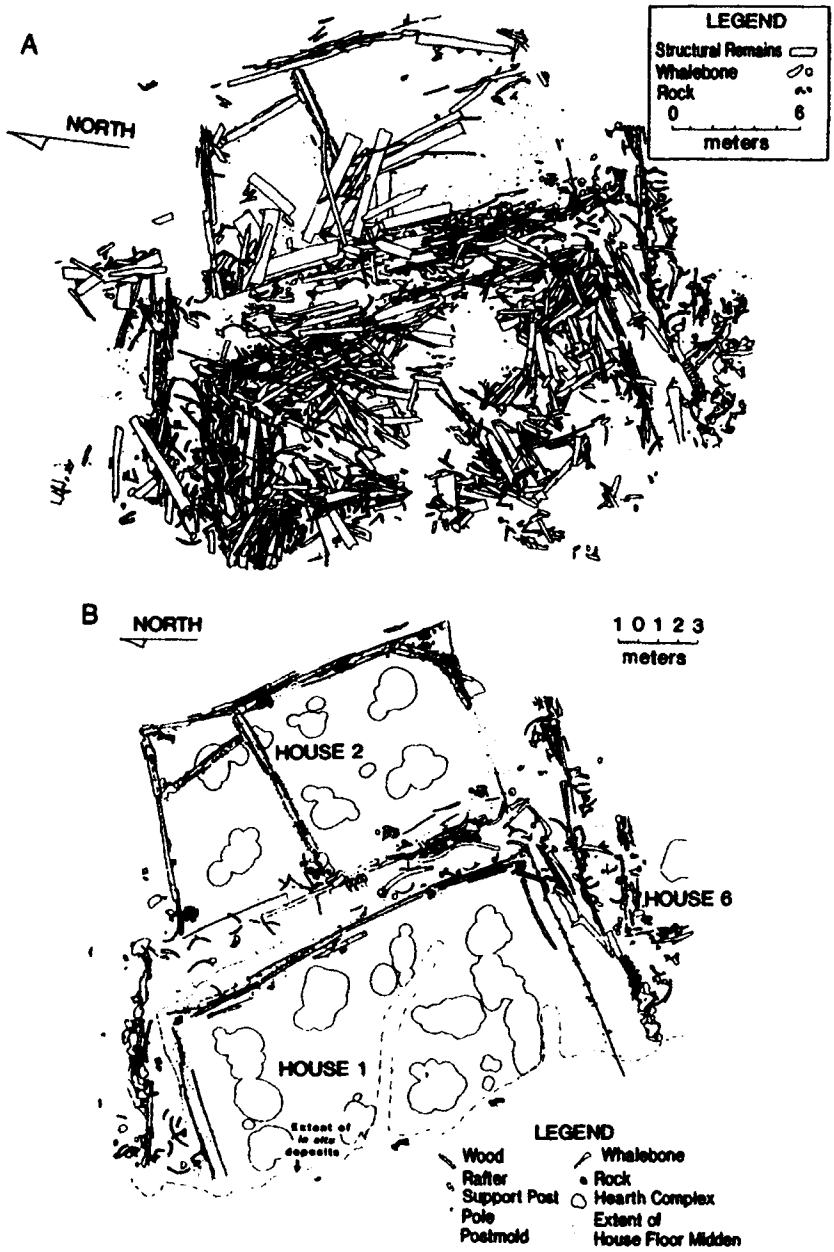


FIGURE 8-6 Ozette houses. (A) Houses 1 and 2 before planks removed. (B) Houses 1 and 2, floor features (Courtesy of Mauger, 1978.)

as opposed to the poorer preservation of the apparently partly contemporaneous material recovered from White Rock Village (Table 8-1).

The Ozette site is located near the north end of the Olympic Peninsula (Figure 8-1). The original excavations were not on the mud slide area, but in 1969–1970 storms exposed the preserved houses and work began in 1970 and continued for eleven years to stabilize these deposits (Samuels, 1983:2). The remains of at least four houses have been recovered. This area has been subjected to multiple mud slides, before, during, and after the houses were present.

The important stratigraphic Unit V includes the four houses, Houses 1, 2, 3 and 5. It appears that House 1 was built first (Figure 8-6), and shortly after a retaining wall was constructed shoreward of House 1, House 5 was built behind House 1. House 5 does not seem to have been occupied long, possibly because of poor drainage. A number of drains were apparently built to try to alleviate this problem (Samuels, 1983:18). A large mud slide then covered House 5. After this slide House 2 was built on top of the place where House 5 had been and House 3 alongside of House 1 and House 2. Then there was a very large mud slide that destroyed all the structures. Two "preliminary" dendrochronological dates of House 1 wall planks are AD 1613 and AD 1719 (Samuels, 1983:24). Because neither are cutting dates, if correct, they indicate that the slide occurred sometime late in the eighteenth century. Samuels (1983:24) suggests that House 1 may have been occupied for "about 100 years." Even with this generous use estimate, the house material dates no earlier than AD 1650 and may all date post-1730.

The sizes of these houses are all about the same: House 1 is 21 × 11 m; House 5 is 20 × 9 m; and House 2 is 17 × 10 m. They all have shed roofs, with the rafters being supported by large pairs of posts that are structurally separate from the walls. Two of the houses had five rafters; the third had four rafters. All houses had 6 to 10 hearth areas, located between the rafters, and sometimes as pairs. The hearth areas by analogy with ethnographic accounts should indicate how many families occupied these large houses. Some of the hearths, though, may have been used for ceremonial or corporate purposes, which appears to be particularly the case for House 1, discussed in more detail below.

As is well known, a wonderful range of perishables were recovered from these deposits, including whaling gear, large, decorative objects, and baskets, as well as the usual archaeological objects, including well-preserved faunal remains. A number of dissertations and articles summarize aspects of this site (Mauger, 1978; Wessen, 1982, 1988; Samuels, 1983, 1989; Huelsbeck, 1988, 1989) and more comprehensive published reports on this material are appearing (Samuels, 1991, 1994). Of particular interest are the studies of spatial variation, which looked at the distribution of archaeological material within and between the houses.

Distribution within the Ozette houses indicated that the open areas around the hearths were kept relatively bare of artifacts, with higher concentrations found nearer the walls in the bench zone, which was used

ethnographically for storage and sleeping. Distribution within the houses also indicated that high-status items were concentrated in the north end of the houses, consistent with ethnographic expectations, although this distribution was clearest in House 1 (Huelsbeck, 1989).

The variation between houses is even more interesting, with House 1 standing out from the other two. House 1 is slightly larger than the other two, and stands in the front row, historically the most prestigious position, and is the one with the most ornamental objects, including the only inlaid bench planks and two large carved panels (Samuels, 1989:153). The high-status corner is most clearly delimited in this house as well (Huelsbeck, 1989:163). In terms of resources, Houses 1 and 2 had a similar suite, but the more prestigious remains are concentrated in House 1. House 5, on the other hand, had much fewer salmon remains present, and the shellfish remains indicate a different set of beaches were exploited (Huelsbeck, 1989:163; Wessen, 1988:196). This evidence certainly supports the idea that access to resources was tightly controlled. It is argued that Houses 1 and 2 probably belonged to the same local group, with House 1 being ranked higher than 2 (Huelsbeck, 1989:166).

Even though Ozette remains to be fully published, this brief survey of the currently available information gives an idea of what will be forthcoming. The potential for important contributions to our understanding of Northwest Coast economic and social organization is very great. We look forward to a comprehensive publication of artifacts and fauna, both the perishable and imperishable, and their distribution as appears to be forthcoming (Samuels, 1991, 1994).

Ethnographic information (Renker and Gunther, 1990) indicates that the villages were occupied year-round on the Olympic Peninsula, which may account for the paucity of late period limited-activity sites in this region. Only the rock shelter at Hoko River is well known, and it appears to be a summer and fall fishing and shellfish-collecting site. A wide variety of fish were obtained there, of which greenling was the most common, and salmon, the second (Wigen and Stucki, 1988). This site has radiocarbon dates to about 800 BP. The dominant mammal is the pelagic fur seal, which only becomes important in the upper two-thirds of the deposit. This site, then, is another example of pelagic resources—including sea mammals—only becoming important in the last 1000 years or so.

Gulf of Georgia

This stage is not particularly well known in the Gulf of Georgia area, in contrast to earlier periods, although it does have a plethora of names. R. Carlson (1954, 1960, 1970) has used the term "San Juan phase" to refer to the recent prehistoric material found on the San Juan Islands and the neighboring Gulf Islands (see sidebar). The distinction between this material and that referred to by Borden (1970) as the Stselax phase on the

mainland Fraser delta, was never really clear (in fact, Carlson [sidebar] suggests that there is no practical difference), probably because Borden never published on the type site, the Stselax site, in any detail. In 1971 Mitchell (1971b) subsumed both San Juan and Stselax in the "Gulf of Georgia culture type," and many others have referred to this class of archaeological cultures simply as "Late."

In any event, this period is marked by the almost complete absence of chipped stone, the dominance of bone and antler objects, but with some pecked and ground stone also occurring. The most common harpoon remain is the composite toggling harpoon valve, and flat-top mauls are introduced. Bone unipoints and bipoints are very abundant, and barbed bone points of various sizes are also found. A well-developed weaving technology is clearly present, as indicated by blanket pins, combs, and spindle whorls. As argued in Chapter 7, this stage appears to evolve in a seamless manner from the previous Marpole phase. Late assemblages also show a reduction in artifact diversity and in frequency of decorated objects (Table 8-2), probably contributing to Borden's mistaken search for an intermediate phase between Marpole and Stselax, detailed in a sidebar in the last chapter.

Montague Harbour (Mitchell, 1971b) is still the best current description of a late base camp component in the Gulf of Georgia, but see also Capes (1964), Monks (1977, 1987), and Charlton (1980) for descriptions of other components that are probably the remains of winter villages. The best analysis of a group of sites is still Carlson's (1954, 1960) on a series of sites on the San Juan Islands (detailed in the sidebar). A recent article by Thom (1992b) investigates the interassemblage variability present at this time in the Gulf of Georgia using the methodology introduced by Matson (1974).

Roy Carlson (1954, 1960) described the results of the University of Washington's excavation at nine sites on the San Juan Islands and proposed a regional sequence based on these results and others reported in neighboring regions. Six sites were judged to belong to the San Juan phase which

> is, for all practical purposes, identical with the Late phase on the Fraser delta (Borden, 1950, 1951) with the Penn Cove phase from the Skagit-Whidbey area (Bryan, 1957) and with the component from Old Man House in Puget Sound (Snyder, 1956). . . . Archaeologically it is definable by the virtual absence of chipped stone artifacts, and the presence of unbarbed and unilaterally barbed bone projectile points, bone barbs for composite fish hooks, small composite toggle heads, numerous wood working tools at winter village sites, and by a settlement pattern involving permanent winter villages of plank houses coupled with numerous summer camp sites. (Carlson, 1960:562–563)

The artifacts found in the six sites supports this summary.

Notice that chipped stone makes up less than 10% of these collections (Table 8-2) except for Cattle Point, where the chipped stone present is likely an admixture from a known earlier component. Notable also, is the

relatively low diversity of artifact types, particularly in contrast to the preceding Marpole phase, where Carlson used 32 classes for 141 artifacts from the Marpole Garrison site compared to 25 classes for the 246 artifacts in Table 8-2. This low variety is compounded by the relatively low density of artifacts in these middens, as large volumes were excavated from some of these sites. Small pointed bone objects make up the majority of this collection, as they do in most late Northwest Coast assemblages. Carlson examined museum ethnographic collections in order to make sense of these, which resulted in the functional names for the classes above.

In contrast with the Washington ocean coast, there are many well-reported limited-activity sites belonging to this stage within the Gulf of

TABLE 8-2

Artifact type	Sites						
	Jekyll's Lagoon	Turn Point	Lime Kiln	Moore	Mackaye	Cattle Point	Total
Bird bone arrow points	13	1	—	4	1	1	20
Bird bone spear points	2	—	5	—	—	1	8
Flat toggle points	—	—	—	1	1	—	2
Round toggle points	—	—	1	—	—	2	3
Unbarbed bone points	1	—	—	—	1	5	7
Salmon-hook barbs	15	—	1	4	10	2	32
Halibut-hook barbs	1	—	1	—	2	—	4
Herring rake barbs	2	—	—	1	—	—	3
Ulna awls	1	2	1	1	5	1	11
Bone splinter awls	2	1	—	2	7	4	16
Split mammal bone awls	3	—	—	—	—	4	7
Toggle harpoon valves	—	—	—	—	2	—	2
Bone chisels	1	—	—	1	1	2	5
Misc. worked bone	14	4	—	20	13	1	52
Antler wedges	2	1	—	1	—	1	5
Misc. worked antler	1	—	1	2	4	1	9
Adze blades	—	1	—	1	1	1	4
Ground slate points	—	—	—	—	—	4	4
Ground slate knives	—	1	—	5	—	1	7
Abraders	1	—	—	—	1	1	3
Misc. ground stone	2	1	1	—	3	2	9
Chipped stone artifacts	1	—	1	4	—	14	20
Mussel shell tools	2	—	—	—	5	1	8
Misc. worked shell	—	1	—	—	—	1	2
Ocher/pigment	—	—	8	1	1	—	2
Historic art.	—	—	1	—	—	—	1
Total	64	13	13	48	58	50	246

*After Carlson, 1960, Table 3, p. 579.

Georgia. Bernick (1983; Bernick and Wigen, 1990) reports on the Little Qualicum site adjacent to a weir on a salmon river and a related wet site on the east coast of Vancouver Island, occupied in the fall. Ham (1982) reports on a springtime clam-digging and herring-processing component at Crescent Beach, and Monks (1977, 1987) reports on a limited-activity herring-processing component at Deep Bay. Mitchell has reported on two limited-activity sites near Victoria (Mitchell, 1980, 1981a), one of which (Mitchell, 1981a) appears to be a springtime shellfish-gathering and herring-procurement component, as well as on two fortified "Trench Embankments" (Mitchell, 1968c).

The trench embankment sites appear to be relatively late in the Gulf of Georgia sequence, but a number of radiocarbon assays indicate they date back to at least 1200 BP (Moss and Erlandson, 1992:84). They are also the first good evidence of community-scale conflict in this regional sequence. There may be two occurrences of trench embankment sites; the first along ethnic boundaries, such as in the northern Gulf of Georgia area where the Kwakiutl were historically encroaching on Salish occupation areas (Mitchell, 1969, 1988a), and the second, more generally, in late proto-historic or early historic times. Moss and Erlandson (1992) report on unpublished investigations that appear to date fortified locations in the Gulf of Georgia to the last 1200 years, and that find these concentrated, at least in part, along ethnic boundaries. If this information about fortified sites occurring in a large-scale fashion beginning about 1200 years ago is confirmed, it is indicative of at least a change in intercommunity hostilities, if not of the initiation of large-scale warfare.

As Mitchell (1990) notes, although there are a number of recent analyses of subsistence from limited-activity components—Bernick (1983), Ham (1982), Monks (1977, 1987) and Mitchell (1981a)—we lack the same kind of analysis on a late ethnographic winter village site. Given the importance of salmon fishing, Bernick's (1983) report on a chum fishing site is probably the most important of these reports on limited-activity sites, and one in which care was taken in evaluating the seasonality (Bernick and Wigen, 1990). There, salmon consisted of 64% by number and 88% by weight of the total identified fish remains (Bernick, 1983:61). Still, an analysis of a winter village site dating to the last 1000 years or so is badly needed to complete the reconstruction of the lifeways of this time period.

In summary, there is abundant archaeological evidence of winter village sites, and more specialized resource procurement sites, as described in the ethnographies, as well as defensive sites. This is in contrast with the relatively modest amounts of artifacts recovered, probably the result of the development of complex objects made out of perishable materials, which the wet site at Little Qualicum (Bernick, 1983) shows did exist in the recent past.

Puget Sound

Thompson (1978) attempted an analysis of functional variability among Gulf of Georgia and northern Puget Sound sites, focusing on site location and functional classification of artifacts. One of the clear results of this investigation is the greater number of limited-activity sites associated with the last 1500 years, far beyond what one would expect even allowing for older limited-activity sites to be less visible in the archaeological record. This analysis is in accord with the published archaeological record reviewed above, which is dominated by limited-activity sites.

Thompson's investigation also demonstrated the extension of the pattern found in the Gulf of Georgia region well into Puget Sound. In particular, a cluster of sites belonging to this tradition are found in the Skagit River delta and the islands offshore (Thompson, 1978:209). In addition, there is a "village in a house" on the west side of Puget Sound, which fits the Gulf of Georgia pattern as well.

The "Old Man House," a late prehistoric and historic site on the west side of Puget Sound, provides a good picture of the size of some historic houses and the artifacts of this time (Snyder, 1956). Snyder's investigation shows that the historic structure was between 12 m (40 ft) and 18 m (60 ft) wide and at least 140 m (496 ft) long, with his best estimate of 162 m (530 ft) long. This house then covered more than 2700 sq. m (29,000 sq. ft). Although the house clearly included a historic component (historic bricks were found used in the post 16 fill), most of the archaeological remains are of prehistoric times, with the historic material being largely confined to the topmost few centimeters (Snyder, 1956:24). The Old Man House assemblage is, as Carlson (1960) argues, closely related to the late material from the San Juan Islands.

Chatters (1989) reports on a smaller proto-historic house of the same age in southern Puget Sound. This structure was 9 m × 27 m, was one of six at this site, and has five clusters of hearths interpreted as living areas occupied by different extended families. Chatters (1989) finds some significantly different distributions of artifacts among the five areas, which he interprets as indicating economic specialization.

A recently investigated site in Seattle, Duwamish No. 1, is more difficult to include in the Gulf of Georgia pattern (Campbell, 1981). This site has two components (Campbell, 1981:177), one dating to about 1300 BP (two radiocarbon dates) and one dating from 100 to 500 BP (four dates). Unfortunately, neither the artifactual nor the partial faunal analyses are partitioned according to the components, making comparisons difficult. Deer remains are the most common mammal remains, followed by elk and harbor seal. Grebe (*Podiceps* spp. or *Aechmophorus* spp.) is the most common waterfowl, indicating a winter use of the site. The most common shellfish remains are butter clams and bay mussel followed by lesser amounts of

horse and littleneck clams. Unfortunately, the fish were not identified in the original report. Butler (1990, 1993), however, later did an analysis of a sample of fish remains and reported on 30 fish taxa. Salmon was the most important, and represented by 93 to 97% postcranial bones. This is a surprisingly high number, given that this site is on a river in which four species of salmon ran, and was inferred to have been occupied during at least some of these runs. Butler (1990:98) reports that one of the denser cranial bones, the exoccipital, does have a relatively high "survivorship," indicating that many whole fish did enter the archaeological record.

The bone and antler assemblage appear to be similar to Gulf of Georgia components of the same age, with composite toggling harpoons one of the most abundant categories. Ground stone is almost absent except for abrasive stones, adze blades, and a few beads. In contrast with these similarities with assemblages from the Gulf of Georgia, the abundance of chipped stone artifacts (ca. 40%) is a surprise, although the common small triangular projectile point is the style found in the Gulf. The lack of separation into two components makes these judgments tentative.

Although no significant structural features were found, it is likely that this site was the location of a Coast Salish winter village. As this is one of the best sources of information on the southern Puget Sound, one can see that the archaeology of this area is little known, and definite statements about similarities or differences with the material further north are not currently possible (Nelson, 1990).

West Coast of Vancouver Island

As in previous stages, the Gulf of Georgia pattern does not extend to the west coast of Vancouver Island, where a different, but equivalent, pattern is seen in the Wakashan linguistic territory. This west coast pattern is well reported at Yuquot (Dewhirst, 1980) and the neighboring Hesquiat area (Calvert, 1980; Haggarty, 1982). Chipped stone is almost absent, the dominant bone artifacts differ stylistically from the Gulf of Georgia, and ground stone is not very common. Salmon is not seen as important as it is in the Gulf of Georgia, but the emphasis on sea mammals, which may have had the same role as salmon does elsewhere in the subsistence economy in this area, does not become important until the last 1000 years.

These patterns are best documented by Calvert (1980) and Haggarty (1982) for the Hesquiat area. Calvert (1980) reports on the faunal remains of three sites that date to this period. Hesquiat Village (DiSo 1), a historic winter village on the outer coast, shows high amounts of rockfish (30–63%), dog fish sharks, whales, and fur seals in deposits dating to the last 1200 years. The fur seals and whales are most abundant in the last 500 years. This pattern indicates that pelagic resources only become important in relatively recent times. According to Calvert (1980:261), the relative lack of salmon,

which never rise above 10% of identified fish at DiSo 1, indicates that the historic control over resource locations was in place; the outer coast Hesquiat villagers did not have access to the salmon streams that are found in the inner coast. In contrast, the inner coast DiSo 9, discussed in Chapter 7, has much higher (36%) amounts of salmon in a contemporary component, although this is still low by Gulf of Georgia standards. The Hesquiat project shows a different suite of resources and corresponding different settlement pattern than that of the Gulf of Georgia, along with evidence of extensive use of pelagic sea mammal resources, including whales.

Large and small toggling harpoons of varying styles are some of the most common implements. Haggarty (1982:121–122) reports 22 composite toggling harpoon valves from Hesquiat Village, along with 16 arming points. The same deposit produced 433 abrasive stones, 27 stone fishhook shanks, and many bone bipoints and unipoints. McMillan and St. Claire (1991) find stone fishhook shanks, abrasive stones, a celt, hammerstones, numerous composite toggling harpoon valves, and very abundant bone bipoints and unipoints at two sites south of Hesquiat dating to the last 1000 years. These excavations resulted in a total of 410 classified artifacts, of which only two were flakes! California mussel tools and whalebone artifacts were also present. McMillan and St. Claire (1991) also report on a defensive site dating to the last 500 years, indicating likely a similar time depth, within the last 1500 years, for this phenomena on the west coast of Vancouver Island and in the Gulf of Georgia.

The Yuquot site excavations produced the most detailed description of a late Nootkan site artifact assemblage (Dewhirst, 1980). The assemblage dating to the last 1200 years is similar to that described above. Dewhirst (1980: 344) reports that by comparing the artifact inventory in this period with ethnographic collections, one can infer increased sea mammal hunting and the first evidence of whaling. In sum, the west coast of Vancouver Island is a different archaeological culture than seen in the Gulf of Georgia and, as Mitchell (1990) argues, has similarities with the late material seen in Queen Charlotte Strait off northern Vancouver Island. The west coast of Vancouver Island is certainly Nootkan during this time, and would be expected to have similarities with material from the historic territory of other Wakashan speakers.

Mitchell (1988a) dates the Queen Charlotte Strait culture to the last 1700 years. Bone tools dominate the assemblages, up to 46% of all artifacts. California mussel shell tools, toggling harpoon valves, abrasive stones, and modest numbers of ground stone complete the assemblage. Additionally, the distinctive ground stone grooved bark beater and flat-top mauls are also present.

The existing faunal information (Mitchell, 1988a) makes it clear that this culture is based on processing and storing salmon. Sea mammals dominate the mammal faunal assemblage, and numerous birds are present.

Full, complete reports are lacking, so not much more can be said at this time. The connection between this and the earlier Obsidian Culture is not clear; at one point, Mitchell (1990) indicates that with further work the Queen Charlotte Strait Culture may be subdivided. Mitchell argues that the Queen Charlotte Strait Culture is the archaeological component of the Wakashan-speaking southern Kwakiutl, which seems to be a reasonable inference. Given the historic accounts of conflicts between the southern Kwakiutl and the Coast Salish, and generally among the southern Kwakiutl, it is not surprising that he also reports fortified "refuge" sites associated with this culture and found throughout the region (Mitchell, 1969, 1990:355).

NORTH COAST CULTURAL PATTERN

Like the central coast, the late prehistoric period on the northern coast, from ca. 1500 BP to the time of European contact, reflects the full development of the Northwest Coast cultural pattern. Faunal and artifact collections, including perishable artifacts, indicate that the different archaeological cultures can be confidently linked with the ethnographic cultures of the area, the Tlingit, Tsimshian, Haida, Northern Kwakiutl, and Bella Coola.

Central Coast of British Columbia

The late prehistoric period on the central coast of British Columbia (Figure 8-7) is represented by the Anutcix phase (1800-800 BP) and the Kwatna phase (500 BP to historic contact) (Carlson, 1972, 1983a; Carlson and Hobler, 1976), which immediately precedes the ethnographic Northern Kwakiutl culture. The cultural pattern for this time period is known from Namu and from excavated sites in the Kwatna area, including Anutcix, Nutlitliqotlenk, and Axeti.

Economic decline continued at Namu (Cannon, 1991:41), which was probably used as a seasonal limited-activity site during this period. At the Kwatna sites chipped stone tools are absent or quite rare by 1500 BP, although small amounts of obsidian microdebitage are found at sites in the Kimsquit area, near the head of Dean Channel (Hobler, 1990:304). The late prehistoric assemblages consist mainly of bone and antler tools, whereas stone grinding and pecking were the most common lithic technologies (Figure 8-8). Water-saturated deposits at Axeti have also revealed the remains of a substantial woodworking industry (Hobler, 1970). Loaf-shaped hammerstone grinders are common at this time, as are small planing adzes made of greenstone (Hobler, 1990:304). Less common, but still characteristic of late period assemblages, are smooth circular stones, some grooved,

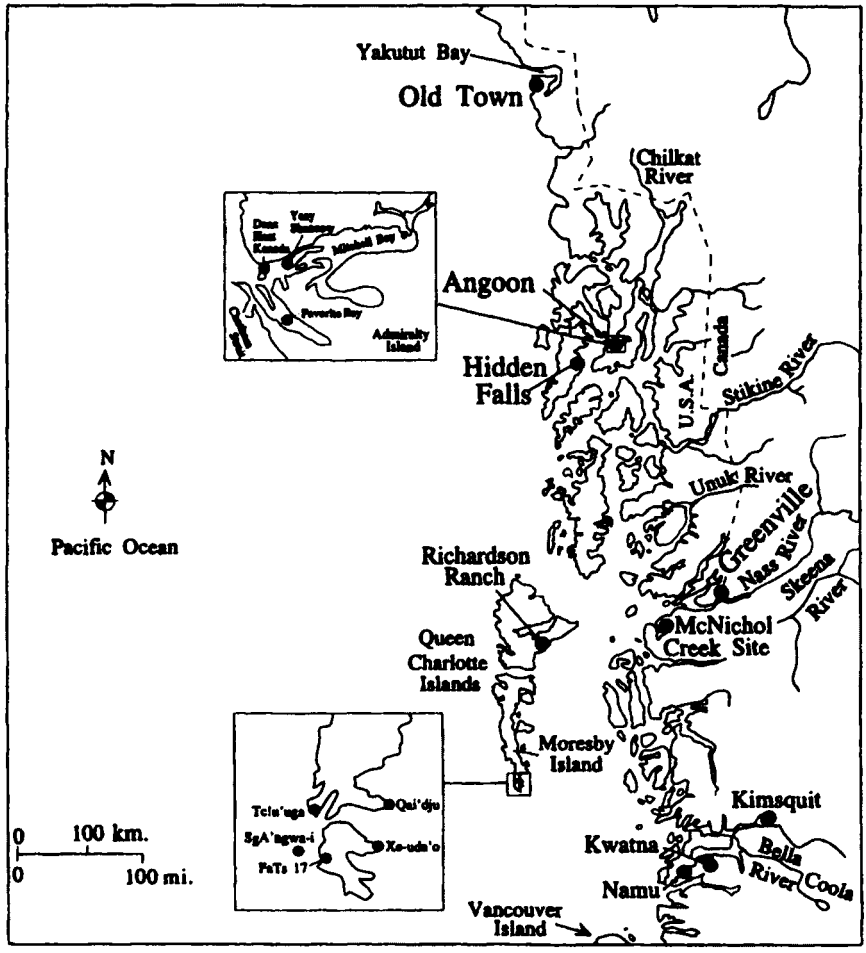


FIGURE 8-7 North coast (1500–150 BP) archaeological sites and localities.

others fully perforated, that may have functioned as net sinkers. Triangular ground slate points, which probably functioned as arming tips for composite harpoons have also been recovered (Figure 8-8).

The bone and antler assemblage has a high frequency of small, slender bone artifacts, which may have been used as fish gorges or as parts of composite fishing or sea mammal hunting tackle (Hobler, 1990:304). Composite hunting tools were a late addition to the Namu inventory (Luebbers, 1978:66). Many of these implements are similar in design to those reported above from the Queen Charlotte Strait and Gulf of Georgia areas for this period.

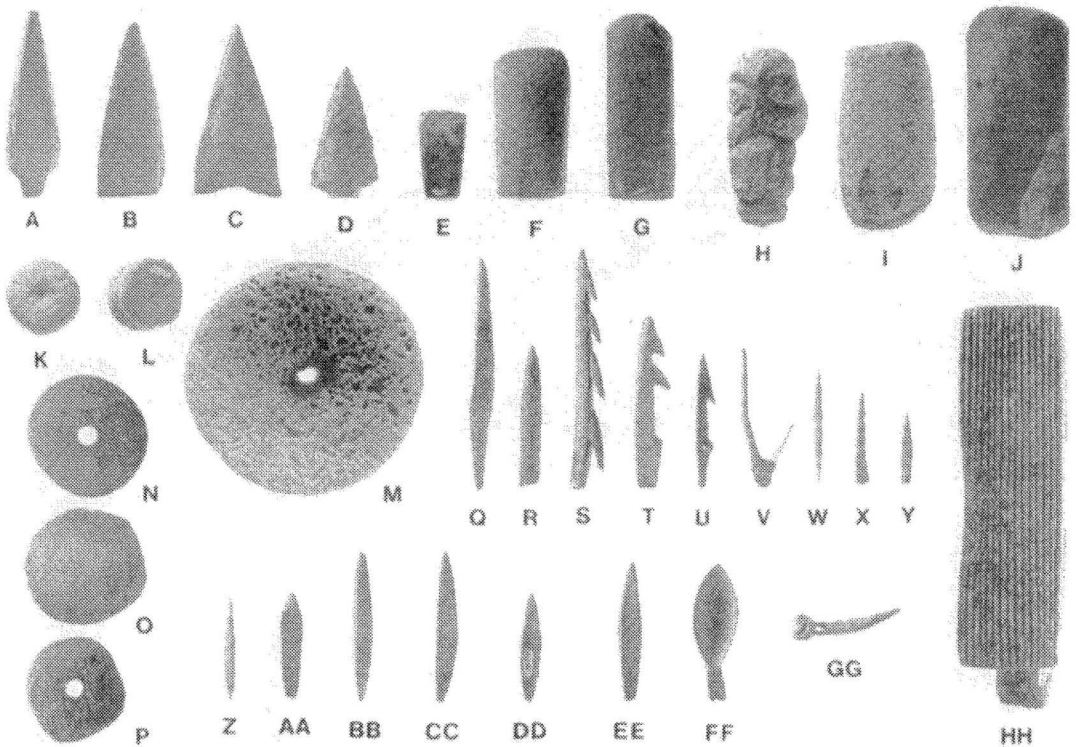


FIGURE 8-8 Late artifacts from the central British Columbian Coast. (A–C) ground stone points; (D) chipped stone point; (E–G) ground stone adze blades; (H, I) hammerstone-grinders; (J) maul; (K–M) circular stones; (N–P) discoidal sea mammal bone objects; (Q, R) awls; (S–U) harpoons; (V) composite fish hook; (W) fish gorge; (X–Z) bone unipoints; (AA–CC) bone points; (DD, EE) composite toggling harpoon valves; (FF) spoon; (GG) blanket pin; (HH) whale bone bark beater. Length of (A) 5.2 cm; (B–D) to same scale. Length of (E) 4.1 cm; (E–G, Q–V, W–Z, AA–EE) to same scale. Length of (N) 9.8 cm; (I–P, S–U, FF–HH) to same scale. (From Hobler, 1990.)

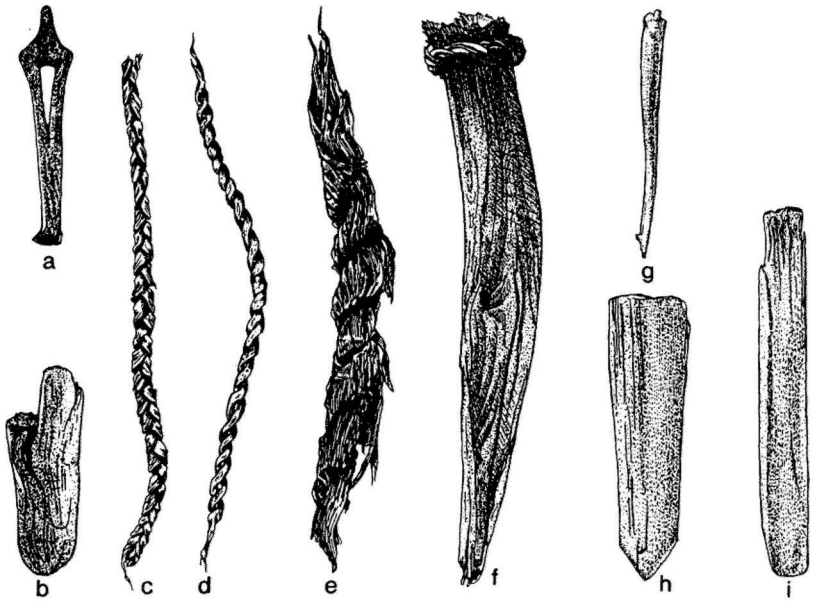


FIGURE 8-9 Perishables from Axeti. (a) spoon handle; (b) wedge tip; (c–e) cordage. (f, h, i) wedges; (g) wooden barb. Length of (a) 12 cm. (From Hobler, 1970.)

Over 1000 artifacts of wood and plant fiber were recovered from Axeti. A wide variety of objects (Figure 8-9) is represented, including wooden stakes, wedges, hafts, bent fishhooks, and even spoons. Plant fiber was used to make rope and cordage, and bark was used for mats, baskets, and even complex basketry hats (Hobler, 1990:304).

Although posts, beams, and other evidence of large plank houses are common in historic period central coast sites, there are few examples of house depressions in clear prehistoric contexts (Hobler, 1990:299). Two exceptions are village sites near Kimsquit, where multiple rectangular house depressions are present. One is reported to have over 20 such features arranged in rows (Hobler, 1972), a pattern similar to that seen at other north coast sites. The sites near Kimsquit are thought to date to the very late prehistoric or proto-historic period of the mid-eighteenth century. A house floor feature at Nutlitliqotlenk (Carlson, 1972) is rectangular in outline and measures 10 × 6 m, which is consistent in size with late prehistoric house depressions farther north, but not with the much larger house platforms seen in the Gulf of Georgia area.

Basic differences exist in site structure and location between sites on the outer coast and those on the inner coast (Hobler, 1983, 1990). Outer coast shell middens are generally larger, deeper, and more concentrated than those of the inner coast. In terms of distribution, outer coast sites are rather

uniformly distributed, and site density is apparently uncorrelated to the differential productivity of local salmon streams. In contrast, sites of the inner coast tend to occur in discontinuous clusters, often near the mouths of salmon streams and their numbers are correlated with the size of salmon runs (Hobler, 1983). Hobler (1983:154) plausibly argues that on the outer coast the lack of correlation of number of sites within 5 km of salmon streams with size of runs probably means immediate proximity to a salmon stream is not important, not that salmon are unimportant.

Prince Rupert Harbour

The late prehistoric period in the Tsimshian area is best known from Prince Rupert Harbour (Figure 8-7), where Period I deposits date from 1500 BP to about 150 BP (MacDonald and Inglis, 1981:52). A number of site components contain archaeological material from this time period. The largest artifact assemblages come from the Boardwalk, Lachane, and Garden Island sites. According to MacDonald and Inglis (1981:52), the Coast Tsimshian pattern "is in full stride" by this period, with abundant evidence of zoomorphic art expressed in a wide range of stone and bone items, such as combs and pins. Changes in the artifact assemblage compared with the preceding Period II are primarily in the form of additions rather than replacements. New artifact forms found in Period I include bone scrapers and composite harpoons; large pecked and ground stone artifacts, such as stone splitting adzes, mauls, clubs, and bowls, occur at Prince Rupert for the first time. These artifacts are similar to those seen in the Angoon and Yakutat Tlingit sites described later in this chapter (Figure 8-12).

The rate of midden accumulation at Prince Rupert Harbour appears to have slowed during Period I. Although only general information exists, subsistence practices apparently continue to be strongly oriented around marine and anadromous resources. It has been suggested that changes in sea mammal hunting tackle may reflect a minor decline in the importance of this resource group, with greater emphasis placed on fishing (Fladmark *et al.*, 1990:234). As we have seen, however, on the west coast of Vancouver Island, a similar change in technology was related to an increase in sea mammal hunting.

Many of the Prince Rupert sites, including Boardwalk and Lachane, have been interpreted as large winter villages (MacDonald and Inglis, 1981:52), based mainly on the size and density of their shell middens. Recent evidence of village organization and dwelling size from the McNichol Creek site (Coupland *et al.*, 1993) generally supports this claim, but also differs in important ways from historic period villages. McNichol Creek is a village site with 15 house depressions, arranged in two rows (Figure 8-10). Bissell's analysis of growth rings in clam shells (Coupland *et al.*, 1993) indicates that the main period of occupation was from fall through early summer, that is,

the expected seasons of winter village sites. Two radiocarbon assays from one excavated house depression have given dates of 1590 ± 90 (Isotrace 16451) and 1580 ± 90 (Isotrace 16452) BP. Two other dates from the shell midden are in the 1600 BP range (Archer, 1992).

All but one of the McNichol Creek house depressions are significantly smaller than houses of the historic period. The house depressions at McNichol Creek average about 11 m long by 6 m wide, and are very similar in

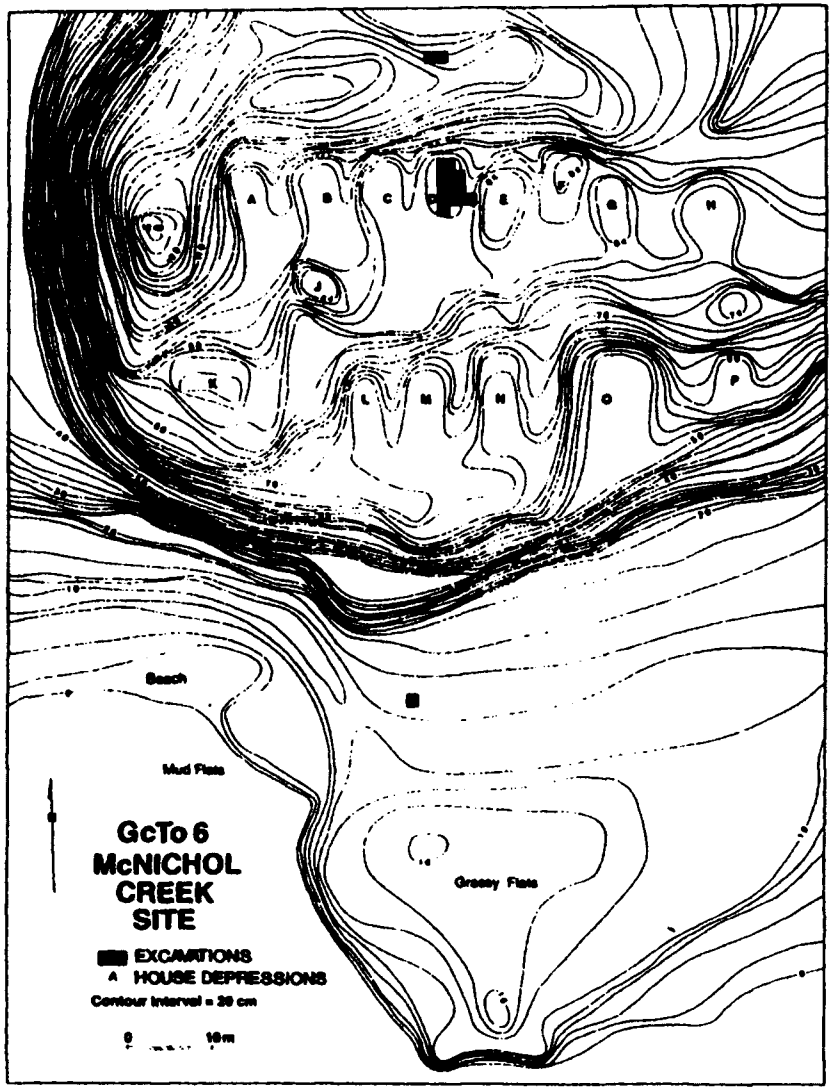


FIGURE 8-10 McNichol Creek site plan (From Coupland *et al.*, 1993.)

size and shape to the 3000-yr-old house depressions at the Paul Mason site. In contrast, historic Tsimshian house depressions in the Kitselas Canyon area (Coupland, 1988a:274), at Kitkatla (Boas, 1916:46–49), and along the Nass River (McNeary, 1976) average over 100 sq. m. As we have seen in Chapter 7 and earlier in this chapter, prehistoric houses on the central coast are also much larger than prehistoric north coast houses (see sidebar for information on other north coast houses). Average household size at McNichol Creek is estimated at 10–12 people, based on dwelling size and the presence of two hearths in the one excavated floor. This estimate is about half the size traditionally given for historic north coast lineage houses (Garfield, 1951:10; McNeary, 1976:78).

> Other information on dwelling size from this part of the north coast for this period is rather limited, but that which exists is generally consistent with the McNichol Creek data. The house depression at Nutlitliqotlenk, measured by Carlson (1972) is 60 sq. m. The two measured, but undated house depressions at Boardwalk site are 54 and 48 sq. m (Ames, 1990). Because both were measured from surface contours and the Boardwalk has a large Period I (1500–150 BP) component, these features probably date to Period I or late Period II. Each of these measurements fits well within the size range of the McNichol Creek site houses. The similarities between late period McNichol Creek houses and the earlier Paul Mason site houses in terms of size, shape, construction technique, and internal features are quite striking. Apparently, the small multifamily household was a stable social unit on the north coast, as it was on the south coast, until at least the beginning of the late prehistoric period. It may be that other household sizes were also present on the north coast; at this time good evidence for them is lacking.

One house feature at McNichol Creek is much larger and deeper than the others, and larger too than any seen at the Paul Mason site. At 13-m-long and 10-m-wide, covering 130 sq. m, this house depression ("O" on Figure 8-10) is more than double the average of the other house depressions. Historically in the Tsimshian area, large dwellings with partially excavated floors were the residences of lineage heads (Garfield, 1951; McNeary, 1976).

The McNichol Creek settlement data are important for two reasons. First, the dwellings, and by inference the households, were rather small with one exception. The size of most households was more similar to those of the earlier prehistoric periods than to households reported in the ethnographies. This suggests that a dramatic increase in dwelling and household size may have occurred some time after 1500 BP, or that the large households reported historically were not a stable form. Second, the evidence of one large house depression at McNichol Creek, which may be associated with a high-status residence, differs from both the early Paul Mason village and from later historic villages, which typically had more than

one lineage head (Mitchell, 1981b, 1983a, 1983b). McNichol Creek may represent an intermediate developmental stage in north coast prehistory; one in which hereditary social inequality had evolved, though without the multilineage villages of historic times.

Late period subsistence evidence from the northern mainland coast of British Columbia comes from three sites, the Boardwalk (Stewart, 1977) and McNichol Creek sites (Coupland *et al.*, 1993) in Prince Rupert Harbour, and the Greenville site (Cybulski, 1992) on the Nass River in historic Nisga'a territory (Figure 8-7). As we have alluded to in earlier chapters, the evidence from the Boardwalk site offers only a cursory picture of subsistence at Prince Rupert Harbour. Vertical provenience of archaeological remains is uncertain in many cases, and the faunal remains in particular suffer from a heavy selection bias. Cybulski (1992:107) notes that although 1041 cubic m of midden deposit were excavated at Boardwalk, only 1409 faunal elements are reported (Stewart, 1977), barely one element per cubic meter. This lends further doubt to the representativeness of the Boardwalk sample.

The faunal remains from McNichol Creek and Greenville are much more numerous. At McNichol Creek, faunal samples were analyzed from an excavated house depression and a midden test unit. Salmon remains predominate in both contexts, and account for 65% of the total faunal assemblage. At 4% of the total assemblage, herring remains are well represented, especially in the house depression (223 elements; 52 elements from the midden test unit). Deer and dog remains are the most abundant mammalian remains, but neither accounts for more than 1% of the total assemblage, as measured by the number of identified elements. As with herring, deer and dog remains were more common in the house depression than in the midden.

Salmon is represented almost entirely (99.6%) by postcranial elements at McNichol Creek, indicating storage. The storage inference is further supported by the distribution of salmon elements, with 32.4% found in the house depression, and 67.6% in the midden. Herring, deer, and dog remains were more common in the house depression than in the midden. These distributions suggest that salmon was processed and disposed of differently than other resources. The low proportion of salmon elements in the house depression is consistent with an idea that these fish were caught and processed at fish camps, and then transported to McNichol Creek for storage and later consumption. Herring and deer likely were caught locally and processed at the site.

Sea mammal remains are not represented in the McNichol Creek sample. Although this could be attributable to sampling bias, it may also relate to the possibility that the people of McNichol Creek did not have access to this resource. Among the historic Tsimshian, as with most other Northwest Coast cultures, differential access to resources was an important basis for

differences in wealth and social status (Garfield, 1939, 1951; Halpin and Seguin, 1990). Differential access to resources among communities by 1000 BP appears to have been demonstrated by the Hesquiat Project (Calvert, 1980; Haggarty, 1982), as discussed earlier in this chapter. This key element of the Developed Northwest Coast Cultural Pattern may have been present at McNichol Creek as early as 1500 BP.

The Greenville site (Figure 8-7) is interpreted by Cybulski as a burial site, or burial area of a larger site, with a minimum of 59 individuals represented (Cybulski, 1992:16). The site has two discrete deposits, including an underlying shell deposit with radiocarbon dates ranging from 1380 to 1045 BP, and an overlying soil deposit with three dates ranging from 790 to 510 BP (Cybulski, 1992:19). The predominantly bay mussel shell deposit contained the bulk of the archaeological remains, including 62% of artifacts, 70% of faunal remains, and 53% of human remains.

Given that food offerings to the dead were a common part of Northwest Coast burial ritual, a key question is, How much of the faunal remains at Greenville represent food for the living, and how much was food for the dead? Three classes of fish constitute the bulk of the faunal assemblage. Salmon remains account for 44% of the total assemblage; the family Osmeridae, including eulachon, smelts, and capelin, 38%; and gadids, including Pacific cod and pollock, 13%. Steller sea lion was the most important

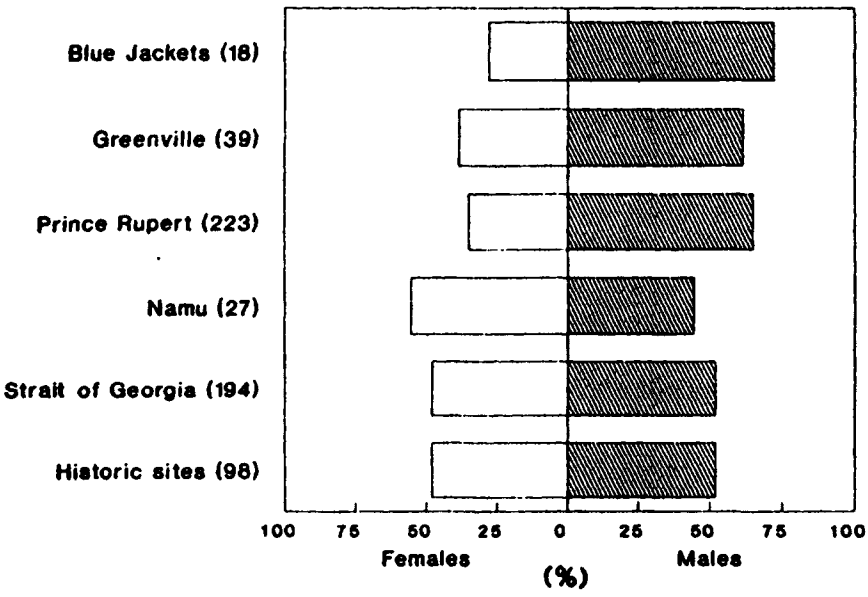


FIGURE 8-11 Greenville burials by gender compared with other British Columbian burial populations. (From Cybulski, 1992).

mammalian food resource, followed by harbor seal. Although accounting for less than 0.5% of faunal remains as measured by number of identified elements (Cybulski, 1992:78), we should remember that adult male Steller sea lions can weigh up to 1000 kg. A minimum of four individuals are represented in the Greenville assemblage, and although at least two were immature, a conservative estimate of 1000–1500 kg of usable meat reflects the importance of this resource. Deer are also represented by a minimum of four individuals, but the elements are associated with low meat utility; mainly mandibles and lower limbs (Cybulski, 1992:89).

Cybulski (1992:62–74, 104–111) suggests that only salmon, gadids, and the sea mammals represented food for the living at Greenville. Elements of these taxa were ubiquitous throughout the midden. The *Osmeridae* elements appear to be almost exclusively eulachon, although positive identifications were difficult to make. The lower Nass River receives a major annual eulachon run, and historically this was an important meeting place in early spring for groups from all over the northern Northwest Coast (McNeary, 1976; Halpin and Seguin, 1990). Eulachon bones at Greenville occurred mainly in four separate concentrations, at least one of which was clearly associated with a burial, leading Cybulski (1992:74) to infer that most of the eulachon remains may have been from food offerings to the dead. Elderberry seeds are also found in clumps and Cybulski (1992:74) infers elderberries were likely food for the dead. Deer elements, especially teeth may also have been offerings, because deer teeth were traditionally used in ceremonial rattles (Cybulski, 1992:89).

Analysis of faunal and floral remains does not always lead directly to the reconstruction of subsistence activities or seasonality. The interpretation of Greenville as a burial site demonstrates the importance of considering contextual evidence in analyzing faunal remains.

The Greenville burials represent the largest burial assemblage from any site on the Northwest Coast dating between 1500 BP and the beginning of the historic period. Moreover, the burials in the shell deposit are among the latest prehistoric shell midden burials from anywhere on the Northwest Coast north of Washington (Cybulski, 1992:36). The only well-dated human midden burials that clearly postdates the Greenville burials is from the Little Qualicum River site in the Gulf of Georgia region, and has an associated date of 730 ± 80 (GaK 6819) BP (Bernick, 1983). The very large sample of 75 individuals dated to the "Transition" at Tsawwassen has radiocarbon dates ranging from 1670 to 1150 BP, approximately the same as Greenville (Curtin, 1991:6). Very few shell midden inhumations postdate 1500 BP on the north coast, and the shift to above ground corpse disposal may have been complete by 1000 to 800 BP (Cybulski, 1992:37).

The ratio of male to female burials at Greenville favors males by a count of 18 to 12 (Cybulski, 1992:49) (Figure 8-11). This pattern is even

more pronounced elsewhere on the north coast at Prince Rupert and Blue Jackets Creek. Only Namu shows a reverse trend. In the Gulf of Georgia area, the male to female ratio is about even. Although the north coast sample used by Cybulski spans a long time range, from ca. 4000 BP at Blue Jackets Creek to perhaps only 500 BP at Greenville, a persistent underrepresentation of females exists. Cybulski (1992:49) suggests that this skewed ratio may be the result of female slaving, at least in the later samples from Prince Rupert and Greenville. Cybulski's idea is that slaves would not have been buried in the same locations as the "free" population. Historically, female slaving was a common practice among the Tsimshian (Adams, 1973), although figures provided by Mitchell (1985:230) show that in 1853 male slaves outnumbered female slaves in Tsimshian communities by 106 to 90. Cybulski, the main proponent of the female slaving hypothesis, has noted elsewhere (1990:58) that the underrepresentation of females at Prince Rupert during Period II coincides with other evidence for conflict, including skeletal trauma (forearm "parry" fractures and fractured skulls) and, as we have pointed out in the last chapter, the appearance of clubs.

The skeletal evidence from burials, including the sex ratios, along with the appearance of clubs, provides the most compelling evidence for the development of "warfare" and slavery on the north coast. Comparative figures cited by Cybulski (1992:156–58) show a much higher proportion of inferred violence among males on the north coast than the central coast for the last 2500 years. The warfare complex is first plausibly seen at Prince Rupert at 2500–1500 BP. It may have continued through the late prehistoric period at Greenville, and was certainly present at the time of historic contact (see Mitchell, 1981b, 1985).

Queen Charlotte Islands

The prehistoric archaeological record of the last 1500 years on the Queen Charlotte Islands is known from the 1400-year-old Council site (Severs, 1974b) on Graham Island, and most recently, from a group of sites at the southern end of the Queen Charlotte Islands (Figure 8-7) in the South Moresby area, historically the territory of the Kunghit Haida (Acheson, 1991).

Acheson's study covered a survey area of 245 km of coastline, penetrating a maximum of 500 m inland. The inventory of sites includes 99 habitation sites, 11 fish traps, three lithic scatters, and two burial sites. Two types of fish traps—stake weirs and stone tidal traps—were recorded, and all were associated with productive salmon streams. Habitation sites included 63 open and 36 rock shelter or cave locations. Open coastline was the preferred location for habitation sites (59). The open sites have a distinctly bimodal distribution with 68% under 500 sq. m and 17% larger than 1750 sq. m. All of these sites have shell deposits, and 19 have surface house depressions. The largest sites, *Qai'dju* and *SgA'ngwa-i*, have 16 and 17 sur-

face house depressions respectively. *SgA'ngwa-i*, on Anthony Island, is also known as Ninstints village (Duff and Kew, 1958), a designated World Heritage Site (MacDonald, 1983a, 1983b, 1989).

Acheson tested a total of 18 sites, including six habitation sites larger than 1000 sq. m, five habitation sites smaller than 1000 sq. m, three rock shelters and four caves. Fourteen excavated sites were radiocarbon dated by a total of 39 assays. The earliest date, 1725 ± 70 (FaTs 17) BP (Acheson, 1991:117), is from the bottom of the rock shelter site FaTs 17. Several dates cluster between 600 and 500 BP, which may have been a period of cultural expansion on the southern Charlottes.

> For the shell middens of the southern Queen Charlotte Islands, Acheson (1991:126–129) postulated two main depositional sequences, an early period characterized by massive, relatively homogeneous shell deposits, and a later period, beginning about 800 BP, in which deposits characteristic of living floor occupations became more numerous. The stratigraphic evidence suggested increased or intensified cultural activity through time. To test this hypothesis, Acheson classified deposits from 13 sites according to their constituent elements. Four main layer types were identified, including (1) "floor" layers, rich in humus and also containing varying amounts of shell, charcoal, ash, sand, and gravel; (2) hearth deposits; (3) shell refuse; and (4) noncultural strata. Changes in the character of deposition were assessed using the chi-square statistic (Acheson, 1991: 127) to determine whether the frequencies of the four layer types differed significantly from what would be expected if site use remained constant through time. The results (Acheson's Table 15, 1991:127) show that habitation deposits (floor and hearth) occur in greater than expected frequencies in the later period, whereas nonhabitation deposits (refuse and noncultural) are overrepresented in the early period. These results support the hypothesis of intensified cultural activity through time.

The 13 largest artifact inventories from the southern Queen Charlotte Islands sites are small, but the full range of functional categories is represented, including implements for manufacturing, procurement and processing, and ritual and adornment (Acheson, 1991:131–139, Appendix 3). Most sites were investigated with only single test units. The largest artifact collections are from *Tc!u'uga* (see sidebar) and *Xe-uda'o* (59). Stone tools are poorly represented by only 13 implements, an average of one per site. Abraders form the largest class of stone tools (5). The bone tool industry is large and diverse. Common tool classes include unilaterally barbed points and harpoons, composite harpoons, bird bone tubes, some of which may have been used as drills, various types of awls, bone wedges, and chisels. In general, late prehistoric bone tools from the southern Queen Charlotte Islands are similar to bone tools from elsewhere on the north coast.

The *Tc!u'uga tool* assemblage (96) comes from two excavation units in adjacent house depressions. One unit, near the rear of the house depression, had an artifact density of 42 per cubic meter, whereas the other unit, located near the center of the house depression, had an artifact density of only 7 per cubic meter. A similar distributional pattern of artifacts was seen in an early historic house feature at Richardson Ranch near Tlell on Graham Island (Fladmark, 1973), and at Ozette, as reviewed earlier in this chapter. Traditionally, the space within a plank house adjacent to the house walls was used as living, storage, and sleeping areas (Blackman, 1990), whereas inner dwelling space was a communal area often used for food preparation and consumption—and slave sleeping area. The distribution of artifacts at *Tc!u'uga* and at Richardson Ranch suggests that tools were most commonly kept in the living quarters and storage areas, and communal household activity areas were kept relatively free of artifacts.

Over much of the Northwest Coast the area at the rear of a house was typically reserved for the head of household and his family (Drucker, 1965; Blackman, 1990), so one might expect to find items associated with high social status in these areas. Acheson (1991:138) reports that in three cases where test units were dug at the rear of a house (*Tc!u'uga, Xe-uda'o,* and *Qai'dju*) artifact density was high and included many items of personal adornment. At *Xe-uda'o,* 35% of the artifacts from the rear were classified as personal adornment, and included a variety of pendants.

Faunal remains were recovered from all 18 sites tested on the southern Queen Charlotte Islands (Acheson, 1991:139–161). California mussel was the most common shellfish species by far, accounting for 95–100% of shell by weight in 13 of 16 middens. Unlike other late north coast components, there is no evidence of mussel replacement by clams. Because the pattern of decrease in mussel abundance in shell middens seems to occur mainly in sites with evidence of long and continuous occupation, these mussel-rich middens may reflect a relatively late human occupation of the southern Queen Charlotte Islands.

Salmon and rockfish were the main fish taxa, followed distantly by halibut. Salmon elements were recovered from all 18 sites, ranging from 10–99% of the fish assemblages, with a mean average of 59%, as measured by number of identified elements. Rockfish elements were recovered from 16 sites, with a range of 0.6–80%, and a mean of 29%. Halibut remains were present in 14 sites, but the proportions were consistently low, exceeding 10% at only one site (*SL!i'ndAgwa-i,* 10.9%). These figures are interesting inasmuch as halibut is cited in most ethnographies as being the most important subsistence resource of the Haida (Murdock, 1934; Blackman, 1990), but the ethnographies may reflect the situation in the northern Queen Charlottes rather than the extreme south. Because halibut can be very large, their absence in the archaeological record could also be the result of butchering offsite and carrying only the flesh back to habitation sites.

Salmon elements were recovered most frequently from living floor deposits, whereas rockfish were most strongly represented in refuse deposits. Acheson (1991:144) suggests that this distribution probably reflects differences in butchering and discard practices. Salmon are represented almost entirely by vertebrae at the large habitation sites, which suggests butchering elsewhere and storage for winter use. On the other hand, the differences in spatial distribution of salmon remains between the South Moresby sites and the McNichol Creek site may reflect nothing more than inadequate sampling.

The most surprising results of the faunal analyses of the southern Queen Charlotte Islands sites are seen in the mammal remains (Acheson, 1991: 147–151). Sea mammals were hunted almost exclusively, and at five of eleven open habitation sites, whalebones were the most abundant. At *Xilgwa-i*, whalebones accounted for 65% of the identified mammal bones; at *Ta'dasL!in*, 64%. Both are large habitation sites. The average percentage of whalebones at large habitation sites was 34, which is greater than the proportion of any other sea mammal. Harbor seal and sea otter remains rank second at 23% each. Acheson (1991:151) allows that some of the whalebone may have come from drift whales, but the same possibility holds for other sea mammals as well. We agree with Acheson and Wigen (1989) that the surprisingly high proportions of whalebones at many sites may indicate that the late prehistoric occupants of the southern Queen Charlotte Islands hunted whales on a regular basis. The whalebone remains in the Hesquiat Harbour region are of the same proportion, and are perceived as evidence of whaling, in accord with ethnographic information (Calvert, 1980:250; Haggarty, 1982). Acheson and Wigen (1989) review the ethnographic literature and point to a number of statements that could refer to occasional Haida whaling in the early historical period, although they judge that if whaling occurred on the Queen Charlotte Islands it was never as important as on the west coast of Vancouver Island.

Southeastern Alaska

One of the best documented regions for this time period is the Tlingit area of southeastern Alaska, largely because of the work of Frederica de Laguna. Her excavations at "Old Town" in Yakutat Bay (de Laguna *et al.*, 1964), and at *Daax Haat Kanadaa* and *Yaay Shanoow* on Admiralty Island (de Laguna, 1960) have made substantial contributions to the study of the emergence of Yakutat Tlingit and Angoon Tlingit culture respectively (Figure 8-7). The artifact assemblage from *Daax Haat Kanadaa*, in particular, has become the standard reference of Tlingit material culture (Figure 8-12). Much of the archaeological material recovered from these sites was originally thought to date to the proto-historic and historic periods (de Laguna, 1960:203; de Laguna *et al.*, 1964:203–204), but recent reexcavation

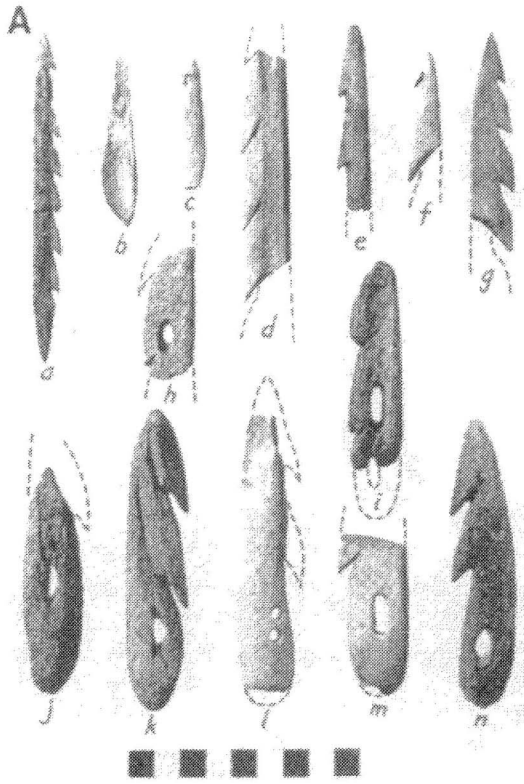


FIGURE 8-12 Prehistoric Tlingit artifacts from the Angoon area. (A) (a) fixed barbed arrow point(?) (b, c) Composite toggling harpoon valves; (d–n) unilaterally barbed harpoons. (B) (a, b) splitting adzes; (c) club head; (d, e) mauls; (f) hammerstone. (C) (a–l) rubbing tools, all but (b), slate; (m, n) unfinished rubbing tools; (o) slate reamer; (p) slate ulo; (q) sandstone saw; (r) marble saw. (D) (a–g) bone bipoints; (h) barbed point; (i, j) bird bone points; (k, l) gaft hook barbs; (m) large bone point; (n) California mussel shell knife; (o) bone point; (p–r) beaver incisor tools; (s, t) butts of heavy weapons; (u) antler dagger; (v) bone rod; (w, x) bone pins; (y) bird bone tube. Scale in cm. (From de Laguna, 1960.)

and radiocarbon dating of the Angoon sites, especially *Daax Haat Kanadaa* and *Yaay Shanoow*, (Moss, 1989b) indicates much greater antiquity for the establishment of the Tlingit culture, with occupation beginning as early as 1200 BP.

Daax Haat Kanadaa is located on a small, steep-sided rocky islet within Kootznahoo Inlet on the west side of Admiralty Island. *Yaay Shanoow* is on a steep rocky headland of Admiralty Island itself, just a few hundred meters from *Daax Haat Kanadaa*. Both are fort sites with concentrated shell middens, which were the foci of de Laguna's excavations. The artifact assem-

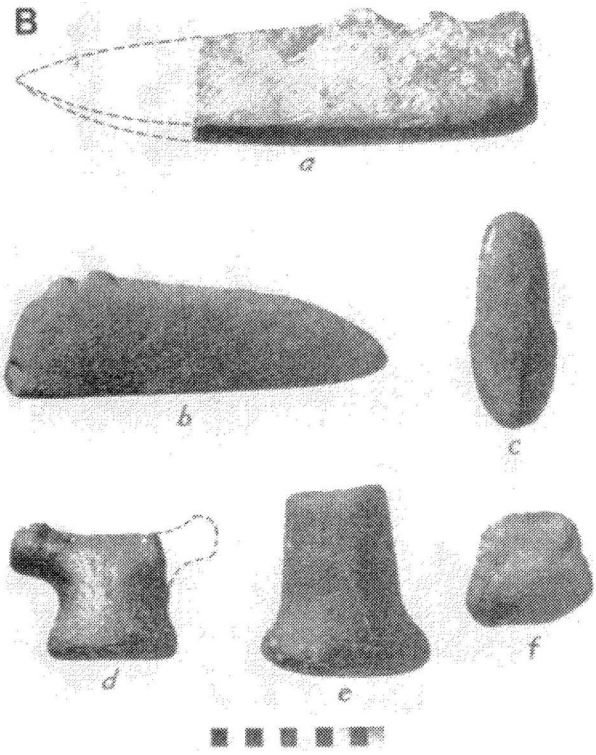


FIGURE 8-12 (*Continued*)

blage from *Daax Haat Kanadaa* is large and diversified. Woodworking is well represented by a variety of tool types. Both splitting adzes and planing adzes were recovered, with the larger, heavier splitting adzes occurring much more frequently (Figure 8-12) (de Laguna, 1960:99–101). At most other north coast sites, the planing adze is more common. Many rodent incisor tools, used for engraving, were recovered, as well as "rubbing" tools, which may have been used for grinding (de Laguna, 1960:106). Among the hunting and fishing implements, bone harpoons were numerous, the most common form being a short, unilaterally barbed type with a tanged base. There was no evidence at either Angoon site of "harpoon arrowheads," which de Laguna (1960:112) describes as small detachable barbed heads, under 13 cm long. This type is found at other sites in the Tlingit area including Old Town III at Yakutat Bay. Barbed bird bone points, possibly used for fishing, were common at *Daax Haat Kanadaa* (de Laguna, 1960:117), but small unbarbed bone points, which are often thought to represent fishhook

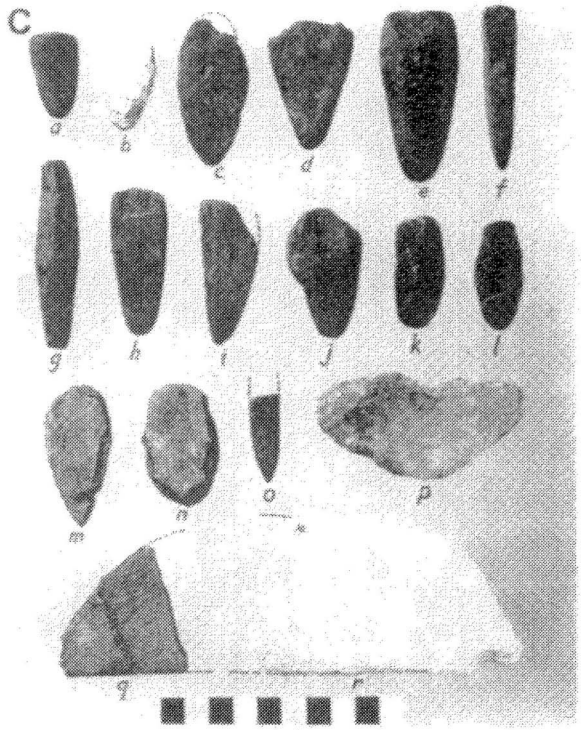


FIGURE 8-12 (*Continued*)

barbs, were rare; only one was recovered. Large bone points, 6–9 cm long, were numerous, and may have been used as gaff hooks. Processing tools include "ulo-shaped" shell knives, made of California mussel, and cobble-flaked scrapers, similar to the Athapaskan chi-tho (de Laguna, 1960:110).

Stone vessels, including lamps, were uncommon at *Daax Haat Kanadaa.* Four were recovered, of which only two could be definitely classified as lamps. Evidence of conflict or warfare in the Angoon area is seen not only in the fortified refuges, but also from the presence of a large club or "slave killer," a bone dagger, and other large bone blades interpreted as weapons. Finally, a variety of items of personal adornment were recovered, including tubular copper ornaments, a tubular coal bead and other beads of bear teeth, bird bone and shale, a T-shaped bone pin, and bird bone tubes. A number of incised pebbles were also recovered, which de Laguna (1960: 122) interprets as "rubbing stones" used by adolescent girls. The incisions include zoomorphic motifs, and geometrics that are similar to the designs found on Chilkat blankets.

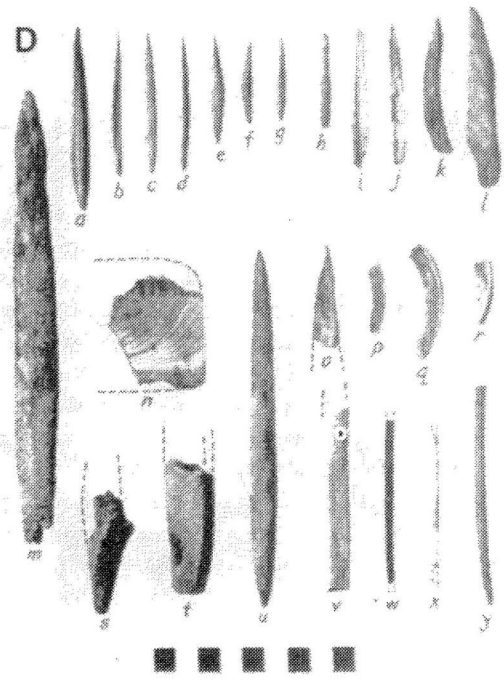


FIGURE 8-12 (*Continued*)

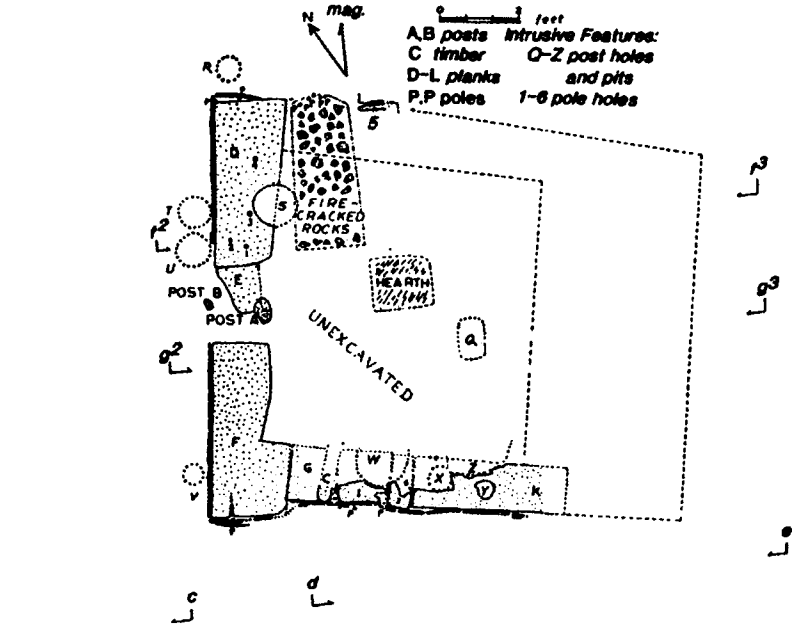
The *Daax Haat Kanadaa* artifact assemblage included four objects of European origin, from which de Laguna concluded that the assemblage derived from "a period when the Tlingit had some access to trade material . . . but before the aboriginal culture had been appreciably changed by whites" (de Laguna, 1960:99). Recent reexcavation and radiocarbon dating at *Daax Haat Kanadaa* and *Yaay Shanoow* (Moss, 1989b; Moss *et al.*, 1989) indicate deposits of prehistoric origin as well. The three dates for *Daax Haat Kanadaa* are 520 ± 70 (Beta 13240), 710 ± 45 (PITT 04), and 1230 ± 90 (Beta 22074) BP. At *Yaay Shanoow*, the dates are 1120 ± 50 (PITT 01), 1130 ± 90 (Beta 13238), and 1220 ± 45 (PITT 02) BP (Moss, 1989b, p. 360). The dates from both sites indicate substantial antiquity for the historic Tlingit cultural pattern.

Both *Daax Haat Kanadaa* and *Yaay Shanoow* are fortified defensive sites. In a recent study of fortified sites, Moss and Erlandson (1992) report on 20 dated examples in Tlingit territory and find that 19 out of 20 have dates that fall within the last 1300 years. They find that 64% of their dates fall between 900 and 1300 BP, indicating that there was a significant use of these features in this period. Moss and Erlandson (1992) could not find any difference in the age of the fortified sites in outer and inner locations,

indicative of a phenomenon that is spread throughout the Alaskan Panhandle and not limited to particular ethnic or cultural boundaries. It is interesting that dates extending back to the previous period are absent, which is in agreement with the dates for fortified sites in the Gulf of Georgia area. Some significant change in intercommunity conflict must have occurred around 1300 years ago.

Moss (1989b) took column samples from four fort sites near Angoon, including *Daax Haat Kanadaa*, and found that in all butter clam (*Saxidomus giganteus*) was the dominant shellfish, and salmon was the most important fish remains. At *Daax Haat Kanadaa*, in addition to salmon, herring remains are also abundant, and salmon cranial bones are absent in the top two-thirds of the deposit, although present at the bottom. Sea otters and harbor seals are the most frequent mammal remains, although Moss (1989b:207) questions the representativeness of the small samples involved. Very similar faunal assemblages were found at two putative villages sites as well; 49-Sit-124, where remains of butter clam and salmon are the two most important fauna, and 49-Sit-259, where the same can be said, although the total identified fish remains totals only 76 (Moss, 1989b). This investigation indicates that "forts" were likely occupied for long periods of time, rather than just being used for short periods as refuges, in accord with Mitchell's (1990) inference of "refuge" use in the Queen Charlotte Strait.

Old Town at Yakutat Bay was settled in the late prehistoric period and abandoned by the beginning of the historic period (de Laguna *et al.*, 1964: 204). Since Eyak, an Athapaskan language, was probably spoken at Yakutat as recently as 200 years ago (de Laguna *et al.*, 1964:2–4, 207), it is unclear how much archaeological material from the area is actually Tlingit. Located at the south end of Knight Island, Old Town was a large village site covering 1.2–1.6 hectares. The main features of the site are four trash mounds with shell, nine "house" pits, although two of these are probably not residences, a small storage house, and numerous small pits that were used as caches. The seven house depressions are all rectangular and range from 18 to 225 sq. m in size, but were not arranged in rows, and were not facing the beach. Three residential structures were excavated, including the two largest. House 1 measured 15 × 14 m and the depression was 1 m deep. Internal features included a 2-m-wide bench, at least against the back wall; evidence of fallen central beams that may have supported a gable roof; and postholes, 35–45 cm in diameter, identified in three corners of the dwelling (de Laguna *et al.*, 1964:58). Another structure, 15 m on a side, (House 7) was also partially excavated, but did not yield as much information. Within the House 1 depression, a later, smaller (6 × 5.3 m), residential structure (House 9) was discovered (Figure 8-13). It was the best preserved. In addition, another house feature was found on top of House 9, which was larger than House 9 (6 × 5.3 m), but smaller than House 1 (ca. 15 × 15 m). In



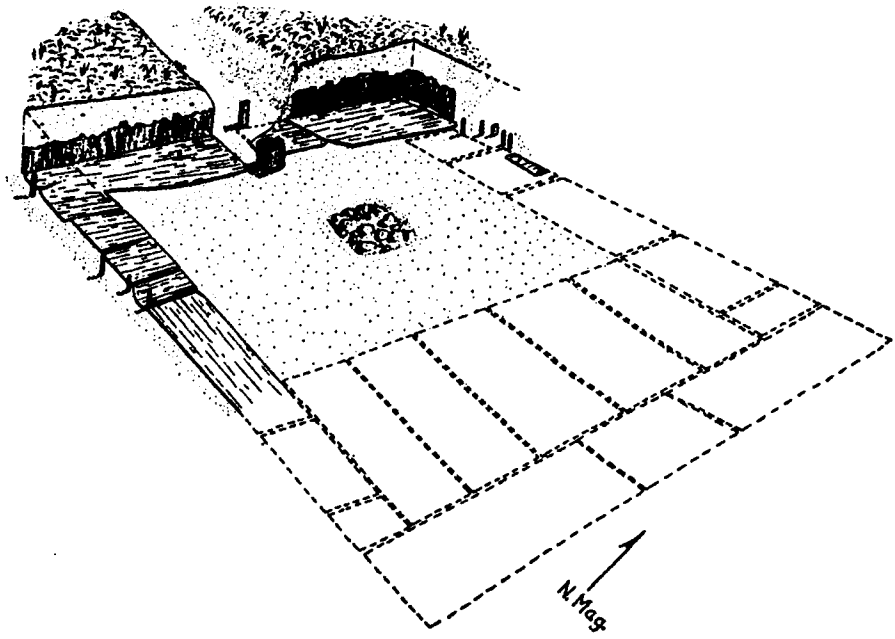


FIGURE 8-13 Old Town House 9, Yakutat Bay. (From de Laguna *et al.*, 1964.)

most respects the Yakutat houses at Old Town were similar to historic Tlingit houses from other areas (de Laguna *et al.*, 1964:73).

Storehouses, such as the one excavated at Old Town, may have been more common on the north coast prior to the emergence of large dwelling structures. In Old Town, two of the residential structures are over 100 sq. m (House 1, 9, House 7, 5). The other five measured house remains range from 18 to 77 sq. m, with the structure on top of House 9 falling somewhere between 40 and 140 sq. m.

A large, diverse artifact collection was recovered at Old Town. The total of 987 specimens includes 548 artifacts of stone, 199 of bone, 95 of wood, roots, bark, or skin, 78 of coal or oil shale, 45 of native copper, three of native copper with wood or bone, and 19 of "drift" iron (de Laguna *et al.*, 1964:85). The last were items made of iron found in driftwood, which informants insisted, correctly according to the artifact assemblage from Old Town, was known long before direct contact with Europeans (de Laguna *et al.*, 1964:88–89). The indigenous assemblage is generally similar to that from *Daax Haat Kanadaa*, but with the addition of 35 stone lamps, shallow pecked stone bowls, ethnographically filled with seal oil with twisted beach grass used for wicks (de Laguna *et al.*, 1964:118). No objects such as beads "or any objects proving direct contact with White men were found at Old Town" (de Laguna *et al.*, 1964:202), demonstrating the precontact nature of the assemblage. Coal or oil shale was used mainly for making beads. The finished beads were tubular and highly polished; many unfinished beads were also recovered. Small fragments of twined weaving, including the remains of a Chilkat blanket, were recovered from a historic shaman's grave.

In addition to the excavations at Old Town, de Laguna also carried out a site survey, working with informants to discern the ethnographic use of sites, as well as to assist in the interpretation of the excavated material (de Laguna *et al.*, 1964). This work with informants resulted in a more complete picture of the past way of life, only equaled by Gould's (1966) investigation in California at the southern end of the Northwest Coast. De Laguna continued her interest in Tlingit ethnography, which resulted in her massive three-volume work *Under Mount Saint Elias* (de Laguna, 1972).

De Laguna's investigation at Old Town archaeologically confirms the presence of Northwest Coast culture at Yakutat Bay, traditionally thought to be the northern limit. Especially important are the house remains, which appear to represent the late prehistoric Tlingit occupation of the site. That these remains may actually be Eyak instead of Tlingit emphasizes the economic or cultural ecological basis, rather than linguistic or ethnic basis, of the Developed Northwest Coast Pattern. The houses include a variety of sizes, with the two largest appearing to be similar to the large "lineage" houses described in the ethnographic record (Olson, 1967).

The subsistence activities for the late period in southeastern Alaska are not well understood. Besides Moss's (1989b) investigations, reviewed ear-

lier, the report on Hidden Falls III, which terminates at about 1300 BP, is probably the best (Erlandson, 1989; Moss, 1989a). Indications are that subsistence pursuits during the early part of the late period were essentially unchanged from the preceding period.

Summary of the North Coast

The full achievement of the Developed Northwest Coast Pattern is seen in all areas of the north coast during the later prehistoric period. Evidence exists for settlement in winter villages with permanent houses, a salmon-based subsistence economy with emphasis on storage, and ascribed social inequality. Perhaps the biggest surprise from this period is the dwelling and inferred household size from Prince Rupert Harbour and the southern Queen Charlotte Islands. Dwellings from the McNichol Creek site and the Kunghit Haida area sites are much smaller than the large "lineage" houses of the historic period. In contrast, variability occurs in the Tlingit area, where houses at Old Town, which date to the end of the prehistoric period, include two of a size that is consistent with large lineage houses, as well as a number of smaller ones.

Except for the Queen Charlotte Islands, and Moss's (1989b) investigations, relatively little is known about limited-activity sites on the north coast. This situation is likely the result of a shorter history of inquiry as the largest, most obvious sites tend to be excavated first. This inference is supported by de Laguna's investigations, which with the aid of informant testimony located many small sites, and, more recently, by Moss (1989b) who has started to explore some of these. Still, though, the nature of the seasonal round and subsistence pattern remain to be discerned.

Fortified refuge sites become an important part of the settlement pattern early, and likely were developed fully within this period. This development is in accord with the situation in the Gulf of Georgia and neighboring areas, but a change from the previous stage, when evidence of interpersonal violence was relatively abundant in the Prince Rupert Harbour burials, but not in the Gulf of Georgia.

CHAPTER SUMMARY

Not surprisingly the final prehistoric cultures of the Northwest Coast have a pattern similar to that seen in the ethnographic record. A north-to-south trend of environmental differences is reflected in variations in subsistence. Pestles, for instance, are associated with acorns, and are only found on the southern coast. In addition to the latitudinal differences, we also find consistent differences, perhaps just as large, between inner and outer coasts, and between areas with and without abundant salmon resources.

Today, surf smelt and eels are found only in the south, and although they have not really been identified in the archaeological record, they are clearly significant resources and must account for some of the north–south differences. Acorns likewise have only been rarely identified archaeologically (Croes, 1992a), although the pestles and mortars used to process them are abundant in the archaeological record. The presence of this set of resources, two of the three that are relatively diffusely spread across the landscape, may be one of the reasons for less emphasis on large households and ascribed status present on the south coast.

Contrasts between rocky outer coasts, where birds, rockfish, and sea mammals dominate, and sites near salmon river estuaries, where salmon, and often clams, are abundant are definitely found in the archaeology. Sites such as Seal Rock are obviously specialized outer coast resource procurement sites, as opposed to many inner coast village sites. The same differences are seen on the Washington coast, where the Minard and Martin sites fit the inner coast model in contrast to the "outer coast" Olympic Peninsula sites with abundant sea mammals. It is only in this last prehistoric stage that specialized sea mammal hunting, including whaling, is found on the outer coast. A similar contrast is found between the west coast of Vancouver Island and the more protected Gulf of Georgia region. Along with this apparent broadening of subsistence is what appears to be a wider variety of salmon fishing techniques in this period, as predicted by Matson (1983) and Croes and Hackenberger (1988).

The same outer coast–inner coast differences are apparent on the north coast, with sites such as Greenville and those at Kitselas Canyon representing the extreme "inner coast" sites, and the Queen Charlotte, Hidden Falls, and Angoon sites being the outer coast, with the mainland coast sites being intermediate, although the distribution of resources is somewhat different in this case. This contrast occurs at a smaller scale further south in places like Hesquiat. Can this be safely interpreted—as the investigators (Frederick and Haggarty) infer—as the result of very localized and complete ownership of the resources? Control over resources is difficult to discern in archaeology, and the Hesquiat Project is one of the few that explicitly examines this question. The results of this project indicate that this aspect of the Developed Northwest Coast Pattern is present there by 1500 years ago. If Matson (1983, 1985, 1992) is correct, ownership of critical resource locations is integrally involved in the evolution of *de facto* ascribed differences. The likely presence of large exclusive village territories prior to 1000 years ago, an unusual feature at contact times, is in accord with more limited resource control by community subunits. Coupland (1985a, 1988b) suggested this occurred prior to the development of pronounced social inequality. Furthermore, Moss (pers. comm.) pointed out that one could predict increased incident of warfare would be correlated with increased resource control.

Just as there are resources abundant only in the south, cod and halibut are more abundant in the north. We were surprised to see how important cod appears to be in the north, even at the earliest times (although it is also found early on the south coast). Although halibut is usually considered to also be very important, even more important than salmon on the Queen Charlotte Islands, our review shows little archaeological evidence for this. Could it be that these large fish were processed in such a way that their remains are underrepresented in the archaeological record? Particularly striking is the lack of halibut and abundance of salmon reported from the South Moresby area by Acheson (1991). Acheson also reports large amounts of whale remains. Could it be that the ethnographic information for the Haida is that misleading? Or does it faithfully reflect the northern Queen Charlotte Islands but is misleading for South Moresby?

Turning to the material culture, in some cases it varies with subsistence; large harpoons obviously are needed for whaling, weirs for salmon rivers, and so forth. Other differences though appear to be ethnic. It is hard to see the differences between west coast Vancouver Island and Gulf of Georgia as stemming from technological factors, but rather as having a large ethnic component, as reflected in the basketry found in wet sites (Bernick, 1987; Croes, 1987). The choice of shed roof versus two gables, versus three gables, does not obviously follow from functional requirements. Some forms, though, like the large shed roofed Coast Salish houses, where the planks are moved from winter village to summer camp, do seem to have functional requirements.

Differences in artifact assemblages appear to be largely either minor, or to consist of rare items. This is in part the result of recent archaeological assemblages largely consisting of pointed bone objects, which are probably small parts of complex composite tools, most components of which usually do not survive into the archaeological record. The Ozette site gives an example of what has been lost. Some of the development of large compound tools may be the result of effective water transportation, so that large, cumbersome specialized equipment, such as reef nets, can be easily transported.

Although Northwest Coast art is justly renown, little is seen on the south coast, and in the central coast it is more abundant in Marpole than in later collections. Again Ozette may give an indication of what is missing from the archaeological record; the vast majority of the Developed Northwest Coast Pattern material culture was perishable, and that includes art objects. Still, examples of the famous obsidian wealth blades are found in the south coast, and would never be interpreted as "functional" objects.

The contrast in social organization between the south coast and the central and northern coasts is clearly seen in the apparent dominance of single-family houses found in the archaeological record on the south coast. We have already questioned whether this lack of large houses on the south

coast results from the use of "standard" archaeological techniques. If this lack of large houses is a valid reflection of the past, we have a real possibility that the pattern of large multifamily households had not extended significantly south of the Columbia River at European contact. Surprisingly, there is evidence that large, multifamily houses are also very late on the north coast. This may be demonstrated by the small houses present at the McNichol Creek site and the mix of small and large houses at Yakutat Bay, as well as the modest house sizes reported by Acheson (1991) on the southern Queen Charlotte Islands. It may be that only on the central coast has the large multifamily household been a stable system over the last 2000 years. We know of no reason to expect such a phenomenon. It also may not be an accident that it is the Gulf of Georgia area that best fits Donald's (1985) interpretation of the Northwest Coast as a class society rather than a rank society, with the larger household size and the presence of a looser fit between household and kinship group than most other places in the Northwest Coast culture area.

Fortifications are abundantly present on the central and north coasts, and this settlement type developed early in this stage. We believe this site type indicates that the hostile intergroup interactions testified to in the historical record, and argued as integral parts of Northwest Coast society by Donald (1985) and Mitchell (1984) were present at least by the beginning of this period. Although the abundant evidence for conflict by 1500 years ago does not mean that interpersonal violence was a necessary part of the development of the Northwest Coast ascribed status system, as argued by Coupland (1985b, 1988a, 1988b), this dating does indicate its deep integration into Northwest Coast culture, and that conflict was not a contact epiphenomenon. Furthermore, because clear evidence of extensive conflict occurs shortly after the initial achievement of Developed Northwest Coast Pattern, the likelihood that conflict is an integral part of the pattern's evolution is substantial. We should remember that Gould's (1966) informants stated that the Point St. George site village was located in an open area so that the inhabitants would not be surprised by raiders.

The last Northwest Coast prehistoric cultures demonstrate a plethora of variations on the theme of the Developed Northwest Coast Pattern. Some of these variations are clearly related to environmental or cultural ecological factors, others to ethnic differences, and many remain poorly understood. Stored foods, with salmon being the most important, winter villages of planked houses, specialized seasonal camps, and a concern with status and wealth, though, are central aspects of society from Point St. George to Yakutat Bay.

9

Review of Developments

* * *

RETROSPECTIVE

Our main theme has been the evolution of the Developed Northwest Coast Pattern. We began describing the entrance of humans into the New World and the earliest evidence of human occupation on the Northwest Coast, and traced the cultural developments to the time of European contact in the late eighteenth century. Two separate cultural processes are evident. The first, lasting from circa 10,000 BP to circa 4500 BP, includes the initial human colonization of the Northwest Coast and a relatively long period of Archaic "settling in" to the coastal environment. In the second stage, from circa 4500 BP to European contact, the elements unique to the Developed Northwest Coast Pattern emerge, and this pattern becomes an integrated system around 2000 years ago.

Peopling of the Northwest Coast and Early Settlement

Recent investigations and our reexamination of existing evidence has shed new light on the peopling of the Northwest Coast. On the north coast, material from the earliest deposits at Ground Hog Bay—and to a lesser extent that at Namu—do not appear to include microblades, and likely predate the well-documented microblade occupation of the north coast. These small assemblages, which include bifaces and burins, resemble the recently described Nenana Complex of central Alaska, and may provide a link between the early migrants into the New World, who evolved into the Clovis Complex and the earliest settlers of the northern Northwest Coast. An outstanding issue in the investigation of early human occupation on the north coast is the relationship—if any—between this early material, which according to Greenberg (1987) would be Amerind, and the later microblade assemblages, which might have been produced by Na-Dene speakers.

On the central coast, the recently discovered and dated Clovis Wenatchee fluted points from western Washington provide a clear link between the Clovis Complex and the Protowestern Tradition. By 11,000 BP Clovis point makers were on the borders of the Northwest Coast Culture Area, south of the Cordilleran ice mass. It is likely that the Clovis Complex makers were actually the first inhabitants of the central and southern Northwest Coast. The Protowestern Tradition then evolved from Clovis, with the earliest Protowestern dates falling in the mid-eleventh millennium.

Two distinct cultural traditions were present on the Northwest Coast by 8000 BP. The Old Cordilleran Culture generally agreed to be derived from Protowestern, as originally presented by Borden (1969), extends from the southern edge of the Northwest Coast, to the northern tip of Vancouver Island and probably occurs at Namu. This tradition includes both coastal and interior manifestations. Present evidence indicates that coastal Old Cordilleran sites depended largely on available local resources for subsistence. Large land mammals were the primary subsistence resources at Glenrose, but at Bear Cove marine mammals predominated, although a variety of coastal resources were used at both sites. In contrast to earlier studies, it now appears that the land–sea relationship stabilized rapidly after the last glaciation and was within 15 m of the modern level by 9000 BP. The North Coast Microblade Tradition stretched from southeastern Alaska to the central coast of British Columbia. In fact, microblades are widely distributed at sites in the northern interior of British Columbia, Yukon, and Alaska, where the early cultures are often referred to as the Denali Complex. The North Coast Microblade Tradition is well represented by faunal data only at the Chuck Lake site, where shellfish and cod remains are abundant. Technologically, coastal microblade assemblages are virtually indistinguishable from those of the interior Denali tradition except for the absence or near absence of bifaces on the coast.

Although the North Coast Microblade Tradition and the Old Cordilleran Culture on the central and south coasts are distinctly different, the coastal and inland components of each area are remarkably similar. The material usually preserved in the archaeological record, then, shows strong continuities between the coast and inland areas, showing little coastal specialization. A distinctive coastal culture, at least in terms of stone tools, is not in evidence prior to 5000 BP.

The period from 9000 to at least 5000 BP is remarkable for the basic cultural continuity that existed in time and space. This is the pattern expected for low-density, highly mobile groups. Technological changes appear to have been very minor for over 4000 years, and although faunal data are few, there is no compelling evidence for major changes in subsistence orientation within this stage. The picture that emerges is one of small, scattered social groups with conservative, foraging lifestyles, making seasonal use of coastal and inland resources.

Emergence of Distinctive Coastal Cultures

The last 5000 years of Northwest Coast prehistory are integral to the development of the cultures encountered by the first Western visitors. We divide this time period into three stages, beginning with the emergence of distinctive coastal cultures, which were adapted to the same resources as later members of the Developed Northwest Coast Pattern, and were limited in geographical extent, clearly different from their interior neighbors. This stage leads to the emergence of the Developed Northwest Coast Pattern, beginning with evidence of salmon specialization and storage, and culminates about 2000 BP with large winter villages and good evidence of ascribed status. The final stage, found in the last 1500 years or so, is the continuation of the Developed Northwest Coast Pattern, and is marked by the emergence of the ethnographic cultures.

The first indications of the emergence of a distinctive Northwest Coast cultural pattern appear between 5000 and 4500 BP along the central and north coasts. This stage includes definite evidence of year round adaptation to coastal resources, and the development of a material culture distinct from interior neighbors—and coastal neighbors as well. Perhaps no feature highlights this change more than the appearance of shell midden deposits in site components all along the coast. Although investigations at Glenrose had long shown that shellfish were used earlier, as confirmed by recent research at Chuck Lake, large, dense shell middens are only found beginning in the coastal adaptation stage. After 5000 BP the use of shellfish increased steadily along the central and north coasts, as did the importance of other coastal resources. This change is currently best seen at the Glenrose site in the Fraser delta in the transition from Old Cordilleran to St. Mungo components, where Matson argues that this is a seamless evolution-

ary change, which includes increasing amounts of ground stone and bone tools. The components of this stage are the result of a much more intensive occupation and less mobile, and much denser, population than the previous stage.

After 5000 BP on the north coast, changes in subsistence orientation and settlement system coincided with important technological changes, including the disappearance of microblades and a dramatic increase in ground stone, bone, and antler tools, resulting in a pattern having no clear relationship with precedents. The net effect of these technological changes was to diminish the cultural differences that previously existed between the north and central coasts, while increasing the distinctions between coastal and inland adaptations. On both coasts a number of distinctive regional coastal cultures developed in this stage, testifying to a lessening of mobility and a focusing on locally available resources. The beginnings of distinctive coastal adaptations and cultures provided the baseline out of which other features of the Developed Northwest Coast Pattern grew.

This stage of initial coastal adaptation appears to have occurred slightly later on the southern portions of the Northwest Coast, but is currently dated to greater 3000 BP on the Oregon coast. This is in contrast to the pattern found north of Puget Sound, where this stage was reached by circa 4500 BP. Because the investigation of early adaptations to the coast south of the Columbia River is just beginning, we might expect that it will eventually be found to begin earlier than current evidence indicates. Already, though, there are signs that the abundant sea mammal remains indicate that the developments on the south coast differ from those further north, where sea mammals are not usually an important resource until much later.

Although there are some exceptions, such as St. Mungo and Glenrose, most sites of the initial coastal adaptation stage are relatively small in comparison with later sites, and dominated by mussel shell rather than clams, which are usually more abundant in later stages. Salmon was an important subsistence resource in most areas during this stage, although its importance has yet to be demonstrated on the south coast, but there is no convincing evidence of intensive production or storage of salmon. Faunal remains from the St. Mungo phase in the Fraser delta indicate a broadening of the marine–intertidal resource base, perhaps related to steady population growth. Christenson (1980) has presented the view that, during population growth, resource broadening occurs before resource specialization, and that would fit this stage. Frederick, on the other hand, has argued in a complementary fashion, that what is observed is a focus on locally available resources, rather than an intensification on any single one. It is striking how the sites for which we have substantial faunal analyses fit the pattern expected of base camps, probably occupied in different seasons over the years, rather than the specialized use and specific seasonality expected of limited-activity sites.

There is no convincing evidence in the Northwest Coast for winter villages of large multifamily plank houses at this stage. The lack of winter villages contrasts with the faunal evidence for substantial duration of occupation at such sites as Glenrose and Crescent Beach, but does not conflict with the faunal evidence, which demonstrates a lack of definite winter seasonality at the same sites. Although winter villages of large planked structures are absent, a single 40–50 sq. m house structure is present during this stage at the Hatzic site, in the lower Fraser valley (A. Mason, 1994). Ham *et al.*, (1986) have argued for substantial nonwinter structures being present at the St. Mungo site. Aside from these two possibly related facets, the winter village trait of the Developed Northwest Coast Pattern is not in evidence during this period. The evidence is in accord, though, with the prestorage model of a winter dependency on shellfish, presented by Croes and Hackenberger (1988). Such a mobile foraging pattern, without storage, may not have differed in important social ways from the preceding stage, although the resources used, population density, and regularity of site use would, of course, have changed.

According to the most comprehensive analysis (Burley and Knusel, 1989) ascribed social inequality is lacking during this period, although burial assemblages only exist from a limited number of sites, including Blue Jackets Creek, Namu, Glenrose, Crescent Beach, and Pender Canal. Distinctive coastal adaptations emerged everywhere on the Northwest Coast between 5000 and 3000 BP, but the classic features of the Developed Northwest Coast Pattern—winter villages, intensive salmon production and storage, inherited status—are not yet present.

The Developed Northwest Coast Pattern

The next stage is the achievement of the Developed Northwest Coast Pattern, elements of which begin to appear around 3500 BP, and by 1500 BP this stage is in place everywhere. The distinctive features of this pattern did not emerge all at once, but the general developments are widespread and relatively synchronous on the central and north coasts.

The development of intensive salmon procurement and storage is the key economic feature of this stage and is at least 3000 years old on the Northwest Coast. The evidence for this extends from southeastern Alaska, where we have remains of fish weirs near the mouths of salmon streams, to the central coast, where faunal data from the Crescent Beach site point to salmon storage during the Locarno Beach phase prior to 3000 BP. A shift in subsistence orientation beginning some time after 3500 BP from a diversified marine–intertidal resource base to a more specialized production of stored salmon, secured the economic foundations of the next stage and appears to be one of the first developments in the emergence of the Developed Northwest Coast Pattern.

The first abundant limited-activity sites are concurrent with large-scale salmon storage. As Lyman (1991) argues, (citing Lightfoot, 1985) in a "logistic" strategy—in contrast with a broad-spectrum "forager" strategy—one expects specialized limited-activity sites, utilized at specific seasons, as well as a substantial residential base camp for each community. It is not surprising that both salmon specialization and limited-activity sites co-occur in Locarno Beach times.

Roughly coeval with the evidence for salmon specialization and storage is the appearance of the first "Northwest Coast-style village" on the Northwest Coast, at the Paul Mason site at Kitselas Canyon. Interestingly, this site is not in a coastal setting. Instead, it is located in a riverine setting about 125 km from the mouth of the Skeena River, at an important historic salmon fishing location. The early house features at the Paul Mason site, although much larger and more substantial than the two small structures reported from Crescent Beach and Hoko River for the Locarno Beach phase, are much smaller than the houses of the later historic period. Social organization at the Paul Mason site during this stage was most likely egalitarian.

Good evidence of hereditary social inequality, perhaps the quintessential feature of the Developed Northwest Coast Pattern, first appears between 2500 and 2000 BP. On the central coast, a number of features characteristic of this pattern—burial associations, items usually connected with status and wealth, and remains of large multifamily plank houses—all appear in Marpole phase components by 2000 BP. At the beginning of the Marpole phase (ca. 2400 BP), we see a concentration of sites near salmon runs, indicating the importance of large-scale salmon procurement and storage to the emergence of social inequality on the Northwest Coast. Co-occurring with the presence of ascribed status in the Marpole phase are some of the most impressive prehistoric artistic endeavors found anywhere on the Northwest Coast. On the north coast the case for having reached this stage is primarily based on pronounced differences in social status inferred from burials, especially at the Boardwalk site in Prince Rupert Harbour. It is probable that ascribed status and the other features of the Developed Northwest Coast Pattern were generally present in north coast cultures by this time. Thus, by 2000 years ago, the Developed Northwest Coast Pattern had been achieved throughout the central and north coasts of the Northwest Coast.

At the beginning of this work we stated that the origins of cultural complexity—and human inequity—transcended the boundaries of the Northwest Coast culture area. Cultural complexity is usually associated with agriculture and the Northwest Coast offers a chance to see how it develops in another context. Not all see cultural complexity as a result of agriculture, some even see agriculture as a consequence of social complexity (Hayden, 1990). It is clear that in the Northwest Coast "cultural complexity" and "human inequity" have a long history and that current evidence indicates

they developed after the establishment of the stored salmon economy, making them a consequence of the economic change and not the cause, as argued by Brookfield (1984) for agricultural intensification. The families lacking economic independence and social equality found in complex societies are the result of limitations on critical resources and not on whether the resources are wild or domesticated. It is in the distribution of resources and how they are allocated that the origins of inequity are to be sought. Economic change does alter the nature and value of the resources, and thus allows for different social arrangements to develop.

The Continuation of the Developed Northwest Coast Pattern and the Emergence of the Ethnographic Cultures

The last 1500 years of prehistory in most areas witnessed a continuation of the Developed Northwest Coast Pattern with minor developments leading up to the emergence of the ethnographic cultures. The archaeological record from the southern coast is far more complete for this period than for preceding stages, with sites stretching from southern Puget Sound to northern California, indicating the ethnographic pattern had been achieved at least by this time. A decidedly marine subsistence orientation is indicated by the faunal remains from several of these sites. Sea mammals appear to have been of particular importance. Permanent villages existed on the south coast, but house size appears to have been smaller than farther north. Evidence of large, multifamily households, a key aspect of the ethnographic Northwest Coast cultural pattern, remains absent, except for the most recent components on the northern Oregon coast. Along the Columbia River, though, the Meier site house is one of the largest yet excavated in the Northwest Coast.

On the central coast, the complexity of the archaeological remains actually diminished after the end of the Marpole phase. Evidence of high-status burials is lacking, but this undoubtedly has much to do with the fact that the tradition of midden interment changed to one of above-ground disposal of the dead. Burial evidence is thus simply largely unavailable for this period. The reduction of artifactual variability may be the result of a increased use of compound tools involving perishable parts. In any event, the majority of the decrease in chipped stone tools appears to have actually occurred during the preceding Marpole phase. There is also some indication that salmon specialization, at least riverine salmon exploitation, may not have been as central in the late period as during Marpole times. This trend was actually predicted by Matson (1983) as an expected evolutionary development. Part of this apparent decreased reliance on salmon is the first extensive evidence of pelagic sea mammal use on the Pacific coasts of Vancouver Island and the Olympic Peninsula, indicating that this activity is a relatively recent addition to subsistence. Numerous limited-activity sites

have been identified in the Gulf of Georgia, testifying to the "collecting" nature of the last 1500 years, in contrast with the first coastal adaptation.

Among the "limited-activity sites" occurring on the central coast during the last 1500 years are fortified locations. This is the first definite evidence for significant intercommunity violence, attested to so abundantly in historical records. Interpersonal violence, as we argued in Chapter 2, is likely an integral part of the Developed Northwest Coast Pattern, and Coupland has made a plausible case for it to have an essential place in the origin of this pattern.

Fortified places also occur along the north coast with the initiation of this period. Although there is burial information from the previous period showing evidence of interpersonal violence, this is the first good evidence for intercommunity conflict. One of the many questions that remain to be investigated is why burial evidence of violence is both so much more prevalent and apparently older in the north coast, whereas fortified sites appear simultaneously along the north and central coasts.

Archaeological evidence from the north coast indicates that small houses of the Paul Mason sort were still common as late as 1500 BP, and in fact, occurred up to contact times. In the Tsimshian area the shift to larger houses may not have occurred until well into the late prehistoric period, and may have not been complete until the early historic period. The "Tlingit" village at Yakutat Bay investigated by de Laguna, indicates that a mixture of large "lineage" houses and smaller ones were present in very late prehistoric times. Despite this possible change in social organization—at this point, very hypothetical—during the late prehistoric period, subsistence orientation and tool technology appear little changed from the preceding period on the north coast. There can be little doubt that the north coast cultures present at 1500 BP were directly ancestral to the ethnographic cultures.

Still, there are a number of other aspects of the recent archaeology that contrast with ethnographic accounts. Recent investigations on the southern Queen Charlotte Islands indicate much greater use of salmon, and much less use of halibut, than indicated by ethnographic work. Even more surprising is the abundant whale remains, suggesting that whaling was occurring. There is much, then, that remains to be resolved about the prehistory of the north coast.

By the time of European contact on the Northwest Coast, the Developed Northwest Coast Pattern was fully in place. The essential elements of permanent or semipermanent village life, intensive resource production with storage, and hereditary social inequality clearly were not products of historic contact, but rather the results of long-term evolutionary trends begun long ago. As discussed in more detail in the last half of this chapter, there are still serious questions about the Northwest Coast economic and social organization. These questions are probably best answered by archaeologi-

cal investigations of contact situations, an area not very well developed in the Northwest Coast. The outstanding exception to this is the investigation at Ozette, whose temporal setting very close to contact and wonderful preservation enables detailed evaluations of the ethnographic record. We expect to see more efforts in this area in the near future.

The precontact Northwest Coast was an area of remarkable cultural achievement, as shown most spectacularly at Ozette. In recent years the people of the Northwest Coast have participated in the unveiling of their past, and have become essential ingredients in this developing picture, following the pioneering work involving native people in their archaeology, as practiced most notably by Frederica de Laguna, and to a lesser extent by Charles Borden, and more recently, with great archaeological success, by Richard Gould. The recent achievements of archaeology, building upon the work of the pioneer archaeologists, make the future of the past on the Northwest Coast look very bright indeed.

THE FUTURE OF NORTHWEST COAST ARCHAEOLOGY

Traditionally, books of this kind are concluded with a look to the future. The future of Northwest Coast archaeology holds great promise because there is so much work yet to be done. Relatively good progress has been made in the past, notwithstanding some problems. In this section, after briefly listing some threats to our future, we identify a number of directions in which we think archaeological research on the Northwest Coast will proceed in the coming years. In many of these areas the work has already begun.

Although we argue that the future of Northwest Coast archaeology is bright, we do admit that there are also some problems, mostly those that also threaten archaeology elsewhere. Archaeological sites are nonrenewable resources and our use of the landscape results in their destruction. This is particularly true with urban development, but also occurs at high rates in forestry. Furthermore, even in relatively unsettled areas the human impact on sites is often very high, as good places to live continue to be so, or are good places for docks and roads. The future of archaeology can only exist if public support for protection of sites continues and increases, on both private and public land. We should not fool ourselves and we need to admit that this costs and can only be justified by the public believing that preserving the past is worthwhile.

At the same time, most fieldwork occurs because of impending destruction of sites, through contract archaeology. There is always the threat that contract archaeology is going to be a low-cost effort to fulfill the legal minimum, with the result that increased knowledge of the past is minimal. It is possible to develop a scheme with maximum expense and minimum value,

with a probable result of a rejection of the necessary support of the protection of archaeological sites. From our perspective, archaeological work is something different than paving a driveway, and flexibility—and therefore minimal regulations—is necessary for effective research. As it stands today there is a great deal of variability in how contract work contributes to the goals of archaeology.

On the Northwest Coast, even away from human activity, sites are often destroyed. The location on the coast puts many sites in the way of high tides and subject to rapid destruction, even without human activities. In other places, such as the Gulf of Georgia, these natural effects are increased by the wakes of ferries and other watercraft. How to deal with these effects is unclear; except for the reign of Bjorn Simonsen as British Columbia Archaeologist in the 1970s, active research in this area is unknown to us. There are, then, some serious threats to continued archaeology. These are, though, neither unique to the Northwest Coast, nor do they threaten an immediate end to archaeology. We turn now to future directions of research.

Continued research in "household archaeology" and "household anthropology" is a high priority for the ongoing study of the evolution of the Developed Northwest Coast Pattern. The household was an important socioeconomic unit of the Developed Northwest Coast culture. Changes in household formation are closely linked to the development of intensive resource production and storage, and to the emergence of hereditary social inequality. The evolution of the Developed Northwest Coast Pattern cannot be fully understood without understanding the household. This research area divides into two themes, the nature of households and the archaeological investigations of past households.

The research reported in the previous chapters indicates that the large, multifamily household, with a highly centralized economy, may well be more prevalent in the ethnographic accounts than in any part of the archaeological record. This unexpected finding is consistent with the large, multifamily household either being a late phenomenon in most areas, or one that is an unstable emergent organization, repeatedly arising from a more stable system of smaller households. This phenomenon of small houses found from Point St. George to Yakutat Bay, puts the archaeological record at some disagreement with the ethnographic record. Resolution of this problem needs, among other things, a reexamination of the nature of the ethnographic record. In a recent paper, Wayne Suttles (1991), the dean of Northwest Coast ethnographers, argues that the organization of the households in the Gulf of Georgia area (the one region where the archaeological and ethnographic records do appear to be in agreement) are significantly different from those found further north. In particular he stresses the greater rigidity of both the house structures and social organizations found on the north coast, with a more integrated economy found there as

well (Suttles, 1991:219). Obviously, it is necessary to examine the nature of households from an ethnographic perspective, as well as systematically studying the existing archaeological data.

From our review, it is clear that the nature of the household in the Northwest Coast needs careful reevaluation—and is likely a key part of the development of the historic pattern. We wonder if the two contrasting views of the nature of Northwest Coast ascribed stratification discussed in Chapter 2—rank or class—are related to size of households. Croes (pers. comm.) has suggested the term of "extended family" households. Is this the appropriate way to conceive of the small house found throughout the south coast and which is also surprisingly common on the north coast? Such a household might consist of no more than two nuclear families, or 10 to 12 total individuals. Would these normally be closely related, brothers, cousins, with such tight social links that equal access to the "necessities of life" could not be denied, whatever status differences existed? If so, these households would fit the definition of a rank society given by Fried (1967).

In contrast, would it only be in large, true multifamily households that the social ties would be distant enough, that a *de facto*, class-divided society existed, as argued by Donald (1985)? We remember, as Donald (1985) demonstrates, that the ideology may be quite different than the actual, and rank ideology be may actively propagated by high-status individuals even in a class-divided society. And would it only be in these situations that slaves would be a significant presence, and actually exist as a separate class? If something like these observations is the case, a lower level of complexity may have existed than generally recognized. One might have, then, circumstances where small houses and a rank society were usual, and except on the central coast, a more stratified, class-organized society was emergent from this base only for short periods of time under certain conditions. These issues will undoubtedly become part of the next set of models intended to explain the evolution of the Developed Northwest Coast Pattern—and the research carried out to test them.

Another factor that will undoubtedly become prevalent in new ideas about the Northwest Coast is the value of "elites" to the society in general as presented by Coupland (1988b) and Hayden (1992a). This question actually has a long history in the social sciences, with the "functionalist" position being put by Davis and Moore in 1945 in an article that stimulated debate in sociology for several decades. The opposing position was well stated by Dahrendorf (1959), who argued that "every society is based on the coercion of some of its members by others" (Dahrendorf, 1959:162). In Northwest Coast studies, the functionalist perspective is found in the well-known studies of the potlatch by Vayda (1961) and Piddocke (1965). This perspective is not now very common in anthropology or sociology, although Hayden and Gargett's (1990) testing of the idea does not seem common either. Further evaluation of this perspective is certain to occur,

but it appears that it will become difficult to make the functionalist assumption. A close reading of Davis and Moore (1945) shows that even they put inherited wealth and slavery outside their general model, and these are the exact forms of stratification under consideration here.

It needs to be pointed out, though, that the classes of "functionalist" and "exploitative" models of social inequality, are not the only possibilities. These terms are good fits to the "homeostatic/functional" (Wood and Matson, 1973) and Marxist/conflicts positions, but these are not the only possibilities. For instance, Croes and Hackenberger's (1988) economic model appears to stand outside, and Matson (1983, 1985, 1989) believes his do as well. A position that allows coercion by elites to be a possibility, and to occur at least sometimes, as it did on the Northwest Coast, does not mean that "elites" are at all times coercive and dysfunctional for the group as a whole. Is this another dimension that correlates with size of households and the rank-class dichotomy?

A third emerging observation, that of economic change before social change, will also undoubtedly be part of new models and their evaluations. If Brookfield (1984) is correct, agricultural intensification brings social change in its wake, rather than being the result of change—and in the cases he studied this is clearly the trend. Matson (1983:128–130) argues that intensification of salmon use, the procurement and storage processes, can be equated with agricultural intensification. The evidence reviewed here (and in more detail by Matson, 1992) indicates that salmon storage occurred before clear ascribed social status developed and before the large multifamily household and village is found. This, as noted previously, is in contrast to what Matson (1983) had argued, and so was a real surprise to discover in his recent investigations at the Crescent Beach site (Matson, 1992).

A key aspect of the development of ascribed status is the control of resources by subcommunity-sized groups. Coupland (1988a) sees this occur by preceding the subcommunity stage by a "egalitarian corporate group" stage where the resources are controlled by the village as a whole. Matson (1989) suggests that the importance of shellfish for "wintering over" may have resulted in ownership or control for shellfish beds prior to the development of a storage economy, giving a preexisting resource ownership validation by the society. It will be interesting to see what other ideas about these matters develop and how they will be evaluated against the archaeological record.

From this discussion it is clear that we will need to obtain more information about past households. Traditionally, most excavation has been done in concentrated shell midden deposits. As Gould (1966) has demonstrated, however, these deposits do not necessarily contain the remains of house features. As Pomeroy (1980) found for the Bella Bella, houses may

not co-occur with the fauna-rich shell middens, but instead be present on less obvious sites. The reasons for a lack of emphasis on house remains are not difficult to understand. Northwest Coast house floors, especially in the later periods, are large features that cannot be properly excavated with small test units. The time and energy, and thus the costs, needed to excavate one house floor can be prohibitive. The effort, however, is valuable, for no other feature is likely to provide comparable information on socioeconomic organization. Because Northwest Coast house floor features can be so imposing, archaeologists may wish to consider new kinds of excavation strategies. Excavation of the actual floor might proceed by cross-trenching to establish the limits of the floor, and then selectively excavating in certain areas of the floor. It may not be necessary to expose the entire floor. In any event, a focus on obtaining information about household organization is gathering momentum in Northwest Coast archaeology (Ames *et al.*, 1992; Coupland, 1985a, 1988a, 1988b, Coupland *et al.*, 1993; Samuels, 1983, 1989; Huelsbeck, 1988, 1989; Chatters, 1989).

In a different direction, important gaps still exist in the culture history record of the Northwest Coast. Although the central coast area, especially the Gulf of Georgia, has undergone long and intensive investigation and is relatively well known, other areas, especially on the north coast, have barely received preliminary investigation. For example, the Graham tradition on the Queen Charlotte Islands, proposed by Fladmark almost 20 years ago, is still poorly understood. Is it derived from the earlier microblade-bearing Moresby tradition, or from the Transitional complex, or does the Graham tradition represent a population replacement on the Queen Charlotte Islands?

Another important culture historical question is the relationship between the earliest material from the north coast at Ground Hog Bay and Namu, which we have suggested may be related to the Nenana Complex and later material. The presence of a premicroblade culture on the northern Northwest Coast needs to be confirmed. Furthermore, the relationship between this material and the succeeding North Coast Microblade material is unclear, as are the dates for the beginning of the microblade material.

The culture history of the south coast, especially before 3000 BP, is poorly understood and requires considerable work. Because the discovery of cultural material older than 2000 years is very recent and is accumulating very rapidly, we can be certain that there remains much yet to be uncovered. Of particular interest is the material older than 2000 BP and the nature of the households present throughout the sequence. At this point the important Palmrose site at Seaside, Oregon, appears to be a unique household on the south coast.

Finally, the relationship between ethnographic accounts and archaeological remains, on the one hand, and historic and prehistoric archaeolog-

ical remains, on the other, must be clarified. Many of the important issues about the nature of household, economic organization, resource exploitation, and so forth, can only be faced by these two sets of detailed comparisons. And work has just begun in these areas.

Issues of ethnicity and cultural affiliation loom large in the future of Northwest Coast archaeology. Because of the coastal setting and the tendency to locate sites near water, a number of water-saturated archaeological deposits have been identified, and those that have been excavated have yielded perishable artifacts including basketry. Like ceramics, basketry is sensitive to ethnicity, but has a much greater precision because it is more complicated and is "additive." Stylistic analysis of basketry from Northwest Coast wet sites, already initiated by Croes and Bernick, holds great potential for the future study of ethnicity, group interaction, and trading and exchange patterns. This is the kind of analysis that once the groundwork has been established, important results occur in a cascading fashion, each building on the last, and allowing new inferences to be made on the existing material. We believe, thanks to these two pioneers, that we are at this threshold.

Northwest Coast archaeology has taken a "back-seat" role in the area of archaeological method and theory, but there are important avenues for future research in this area as well, especially in methodology. Most coastal sites that date to within the last 5000 years—and even a few that are considerably older—contain shell deposits. Shell deposits can accumulate much faster than most nonshell layers. This frequently results in very complex midden stratigraphy. In many cases, layers can represent discrete cultural events, such as a single act of refuse disposal or resource processing, or part of a season, as demonstrated at Crescent Beach. Perhaps, Ham (1982) has made the greatest contributions in this area, developing the field methods and laboratory techniques to exploit these attributes, as well as explicit models of midden formation. Matson was able to rely on Ham's work in making the inferences on the occurrence of salmon storage reported earlier. Finally, shell middens undergo natural transformations related to mineral leaching and organic preservation that have no parallel in nonshell deposits. On the Northwest Coast, Stein (1991) has already made important steps in this direction. We expect that future research will expand on Ham's and Stein's work.

Northwest Coast archaeological sites, especially shell middens, tend to be "faunal rich" and "artifact poor." In recent years faunal recovery and analysis have become important parts of Northwest Coast archaeological research designs, as archaeologists address questions about prehistoric subsistence economy. Shell middens typically afford excellent faunal preservation. Today, almost all research designs contain strategies for obtaining representative samples of faunal data from middens. What is evolving,

though, is a greater sensitivity to the provenience and nature of the samples, as alluded to above with respect to Ham's work. We expect this trend to continue in the future. We also expect that Northwest Coast archaeologists will continue to develop and refine analytical techniques for measuring faunal abundance, discerning butchery practices and hunting patterns, as well as investigating the presence or absence of storage. At present, models of prehistoric Northwest Coast subsistence economies are far ahead of the data and analytical techniques needed to test them. We expect this gap to be reduced in the future.

Explicit models with testable expectations are not scarce for the Northwest Coast problems, but most are relatively recent. Croes and Hackenberger have definitely set the pace with their important contribution. Given the importance of the economic subsystem, we expect to see all the factors discussed in the previous paragraphs to be integrated into future models. We may also see a much more rapid integration of archaeological data into models, or the evaluation of models through evolving archaeological information. We have already participated in this sort of interaction via E-mail (electronic mail), and find it profitable in terms of research, but not exactly directly evident on one's c.v.! This curious result occurs because ideas, data, and evaluations can be processed in a highly iterative fashion via the Internet, so that what would otherwise be a series of meeting papers and publications over several years (adding to one's c.v.) is resolved in a few months via E-mail. In any event, more explicit, better grounded models will be forthcoming, integrating our increasing understanding of the Northwest Coast prehistory.

Northwest Coast archaeology has traditionally been "single site-oriented"; that is, most of the emphasis has been on site excavation (especially large sites), rather than systematic regional site survey. Although there are some reports that do include discussions of site settings, little settlement pattern work has been carried out. The Northwest Coast physical environment may be partly responsible for this. The rugged topography and lush coastal vegetation make ground survey extremely difficult. When a survey is done, it is usually done from the water (i.e., in boats), which means that shoreline sites are well represented, but inland sites are not. Thus any argument that prehistoric Northwest Coast people rarely ventured inland from the coastline becomes a self-fulfilling prophecy. As archaeological research on the Northwest Coast shifts from chronological reconstruction to investigating prehistoric behavioral patterns, archaeologists must begin to adopt a more regional perspective, examining sites—both coastal and inland—in terms of size, location, and other attributes in order to reconstruct seasonality and site function.

In this work, we made frequent references to Draper's (1988) dissertation on the southern Oregon coast, which dealt in part with settlement

pattern questions. Two other relatively recent dissertations have focused on settlement pattern, Pomeroy's (1980) for the Bella Bella area, and Thompson's (1978) for the Skagit Delta, and secondarily, for the Gulf of Georgia area. Thompson's work, in particular, points toward the future, with an attempt to look at site function and site location, as well as change through time. Acheson (1991), although not exactly focusing on settlement pattern, does investigate a number of sites in a region and demonstrates how a relatively modest amount of excavation can result in a substantial advance in knowledge, as does Moss's (1989b) work in southeastern Alaska. There is also the volume edited by Greengo (1983), which has some chapters on this topic. Still, because of the past scarcity of systematic regional approaches on the Northwest Coast few opportunities exist to carry out the kind of work initiated by Thompson. We expect this situation to change in the near future.

Lastly, archaeology appropriates culture, literally removing it from the ground. Moreover, North American archaeologists typically appropriate culture that is not part of their own heritage (i.e., white archaeologists by excavation destroying Indian sites). Nowhere is the appropriation of the culture of others more dramatically seen than on the Northwest Coast, where the descendents of the precontact cultures maintain vibrant societies, with strong historical links to the past. Today, Northwest Coast archaeologists are working with—and in many cases—for native people. This relationship goes beyond short-term employment and reports for native groups, long standard on parts of the Northwest Coast, but includes archaeological participation in native-run public information programs, and academic training. Recognition that archaeologists have important responsibilities to native people to respect their heritage and share information is not new on the Northwest Coast. Pioneers like Borden and de Laguna regularly worked with Native people, not independently of them. That message, however, has all too often been forgotten or ignored.

In all areas of North America, native people are actively exercising their prerogatives to control access to their culture. This activity in many places includes control over archaeological work and certain collections. This trend has been seen as a threat to "scientific" archaeology, where archaeologists typically portray themselves as custodians for all people of the unowned past. Just try to get access to an unpublished collection, though! We hope that this potential conflict recedes. There are many areas in which native and archaeological values coincide and native groups do have a special connection to New World archaeology. In the last twenty years there have been a number of cooperative ventures on the Northwest Coast. At the time of writing, the situation looks very encouraging in this regard. We expect that future Northwest Coast archaeology will no longer be seen as an alien discipline but viewed as part of the study of their past. After all, the truly unusual aspect of the Northwest Coast in world prehistory is the close

connections between the archaeology and the ethnography of the complex Northwest Coast societies, which enable this area to have a unique potential to contribute to our understanding of the human condition. We conclude with Charles E. Borden's favorite toast: To the future of the past!

This page intentionally left blank

References

Abbott, Donald N.

1972 The utility of the concept of phase in the archaeology of the southern Northwest Coast. *Syesis* 5:267–278.

Acheson, Steven

1991 *In the wake of the ya'aats' xaatgaay ('Iron People'): A study of the changing settlement strategies among the Kunghit Haida.* Unpublished Ph. D. dissertation, Oxford University, Oxford.

Acheson, Steven, and Rebecca Wigen

1989 Did the Haida whale prehistorically? In *Development of Hunting-Fishing-Gathering Maritime Societies Along the West Coast of North America*, ed. by B. Onas. Reprint Proceedings, Vol. IIIC, the Circum-Pacific Prehistory Conference, Seattle, Washington, August 1–6, 1989. Washington State University Press, Pullman.

Ackerman, Robert

1968 *The archaeology of the Glacier Bay region, southeastern Alaska.* Washington State University, Laboratory of Archaeology, Report of Investigations 44, Pullman.

1974 Post-Pleistocene cultural adaptations on the northern Northwest Coast. In *Proceedings of the International Conference on the Prehistory and Paleoecology of the Western Arctic and Subarctic*, University of Calgary Archaeological Association, Calgary. Pp. 1–20.

1980 Microblades and prehistory: Technological and cultural Considerations for the north Pacific Coast. In *Early Native Americans: Prehistoric Demography, Economy, and Technology*, ed. by D. L. Browman. Mouton, The Hague. Pp. 189–197.

1989 Early subsistence patterns in southeastern Alaska. In *Diet and Subsistence: Current Archaeological Perspectives*, ed. by B. V. Kennedy and G. M. LeMoine. The Archaeological Association of the University of Calgary, Calgary. Pp. 175–189.

Ackerman, Robert, T. Hamilton, and R. Stuckenrath

1979 Early culture complexes on the northern Northwest Coast. *Canadian Journal of Archaeology* 3:195–209.

Ackerman, Robert, Kenneth Reid, James Gallison, and Mark Roe

1985 *Archaeology of Heceta Island: A Survey of 16 timber harvest units in the Tongass National Forest, southeastern Alaska.* Washington State University Center for Northwest Anthropology, Report No. 3, Pullman.

Ackerman, Robert, Kenneth Reid, and James Gallison

1989 Heceta Island: An early maritime adaptation. In *Development of hunting-fishing-gathering maritime societies along the west coast of North America*, ed. by B. Onas. Reprint Proceedings, Vol. IIIC, the Circum-Pacific Prehistory Conference, Seattle, Washington, August 1–6 1989. Washington State University Press, Pullman.

Adams, John

1973 *The Gitksan potlatch: Population flux, resource ownership, and reciprocity.* Holt, Rinehart, and Winston, Toronto.

Adovasio, James M.

1980 Fremont: An artifactual perspective. In *Fremont perspectives*, ed. by D. B. Madsen. Antiquities section, Selected papers, Vol. 7, No. 16, Division of State History, Salt Lake City. Pp. 35–40.

Adovasio, James M., J. Donahue, K. Cushman, R. C. Carlisle, R. Stuckenrath, J. D. Gunn, and W. C. Johnson

1983 Evidence from Meadowcroft Rockshelter. In *Early man in the New World*, ed. by Richard Shutler, Jr. Sage Publications, Beverly Hills. Pp. 163–189.

Adovasio, James M., J. Donahue, and R. Stukenrath

1992 Never say never again: Some thoughts on could haves and might have beens. *American Antiquity* 57:327–331.

Allaire, Louis

1978 *L'archaeologie des Kitselas d'après le sité stratifié de Gitaus (GdTc2) sur la rivière Skeena en Colombie Britannique.* National Museum of Man, Mercury Series, Archaeological Survey of Canada Paper No. 72, Ottawa.

1979 The cultural sequence at Gitaus: A case of prehistoric acculturation. In *Skeena River prehistory*, ed. by G. MacDonald and R. Inglis. National Museum of Man, Mercury Series, Archaeological Survey of Canada Paper No. 87, Ottawa. Pp. 18–52.

Ames, Kenneth

1979 Report of excavations at GhSv2, Hagwilget Canyon. In *Skeena River prehistory*, ed. by G. MacDonald and R. Inglis. National Museum of Man, Mercury Series, Archaeological Survey of Canada Paper No. 87, Ottawa. Pp. 181–218.

1981 The evolution of social ranking on the Northwest Coast of North America. *American Antiquity* 46:789–805.

1983 Towards a general model of the evolution of ranking among foragers. In *The evolution of maritime cultures on the northeast and northwest coasts of North America*, ed. by R. Nash. Simon Fraser University Department of Archaeology Publication No. 11, Burnaby. Pp. 173–184.

1985 Hierarchies, stress and logistical strategies among hunter-gatherers in northwestern North America. In *Prehistoric hunter-gatherers: The emergence of cultural complexity*, ed. by T. D. Price and J. A. Brown. Academic Press, Orlando. Pp. 155–190.

1986 Prehistoric Subsistence Economy in Prince Rupert Harbour, British Columbia. Paper presented at the Canadian Archaeological Association Annual Meetings, Toronto.

1990 Life in the Big House: Household Labor and Dwelling Size on the Northwest Coast. Paper presented at the American Anthropological Association Meetings, New Orleans.

Ames, Kenneth M., Doria Raetz, Stephen Hamilton, and Christine McAfree.

1992 Household Archaeology of a southern Northwest Coast plank house. *Journal of Field Archaeology 19*:275–290.

Anderberg, Michael R.

1973 *Cluster analysis for applications.* Academic Press, New York.

Andrews, J. T., and R. M. Retherford

1978 A reconnaissance survey of late quaternary sea levels, Bella Bella/Bella Coola region, central British Columbia coast. *Canadian Journal of Earth Sciences 15*:341–350.

Apland, Brian

1981 Archaeological Salvage Excavation at DgRv9—Valdes Island. Report on File at the Archaeology Branch, Victoria, B. C.

Arcas Consulting Archaeologists, Ltd.

1991a Archaeological Investigations at the Little Beach Site, Ucluelet, B. C. Report on File at the Archaeology Branch, Victoria, B. C. Prepared by Arcas Consulting Archaeologists, Ltd. Port Moody, B. C.

1991b Archaeological investigations at Tsawwassen, B. C., Volume I, Introduction. Report on file, Archaeology Branch, Victoria, B. C. Prepared by Arcas Consulting Archaeologists, Ltd. Port Moody, B. C.

Archer, David

1992 Results of the Prince Rupert Harbour Radiocarbon Dating Project. Manuscript prepared for the British Columbia Heritage Trust, Victoria.

Archer, David, and Kathryn Bernick

1990 Perishable Artifacts from the Musqueam Northeast Site. Manuscript on file at the Archaeology Branch, Victoria, B. C.

Ball, Bruce F.

1979 Archaeological Investigation of the Beach Grove Site: A site evaluation. Report on file, Heritage Conservation Branch, Victoria, B. C.

Baumhoff, Martin

1963 *Ecological determinants of aboriginal California populations. University of California Publications in American Archaeology and Ethnology 49*:155–235.

Beattie, Owen

1972 Salvage archaeology at Bliss Landing. In *Salvage '71*, ed. by Roy L. Carlson. Department of Archaeology Publication No. 1, Simon Fraser University, Burnaby. Pp. 23–39.

1980 *An analysis of prehistoric human skeletal material from the Gulf of Georgia region of British Columbia.* Unpublished Ph. D. dissertation, Simon Fraser University, Burnaby.

Bennett, Ann C.

1988 *Whale Cove (35LNC60): An archaeological investigation on the central Oregon Coast.* Unpublished Master's Thesis, Department of Anthropology, Oregon State University, Corvallis.

Bennett, Ann C., and R. Lee Lyman
1991 Archaeology of Whale Cove (35LNC14). In Lyman, R. Lee (1991) *Prehistory of the Oregon coast: The effects of excavation strategies and assemblage size on archaeological inquiry.* Academic Press, San Diego. Pp. 241–266.

Bense, Judith
1972 *The Cascade phase: A study in the effect of the Altithermal on a cultural system.* Unpublished Ph. D. dissertation, Department of Anthropology, Washington State University, Pullman.

Bernick, Kathryn
1983 *A site catchment analysis of the Little Qualicum River site DiSc 1: A wet site on the east coast of Vancouver Island, B. C.* National Museum of Man, Mercury Series, Archaeological Survey of Canada Paper No. 118, Ottawa.
1987 The potential of basketry for reconstructing cultural diversity on the Northwest Coast. In *Ethnicity and Culture,* ed. by R. Auger, M. F. Glass, S. MacEachean, and P. H. McCartney. Proceedings of the 18th Annual Chacmool Conference, Archaeological Association, University of Calgary, Calgary. Pp. 251–257.
1989 Water Hazard (DgRs 30) Artifact Recovery Project Report. Report submitted to the Archaeology and Outdoor Recreation Branch, Victoria, B. C.

Bernick, Kathyn, and Rebecca Wigen
1990 Seasonality of the Little Qualicum wet site. *Northwest Anthropological Research Notes 24:* 153–159.

Berreman, J. V.
1944 Checto archaeology: A report of the Lone Ranch Creek shell mound on the coast of southern Oregon. *General Series in Anthropology 11,* Menasha.

Berry, Michael S.
1982 *Time, space, and transition in Anasazi Prehistory.* University of Utah Press, Salt Lake City.

Binford, Lewis R.
1971 Mortuary practices: Their study and potential. In *Approaches to the social dimensions of mortuary practices,* ed. by J. Brown. Society for American Archaeology Memoir, 25. Pp. 6–29.
1980 Willow-smoke and dogs' tails: Hunter-gatherer settlement systems and archaeological site formation. *American Antiquity 45:*4–20.

Blackman, Margaret B.
1972 Nie:wons, the "monster" house of Chief Wi:ha. *Syesis 5:*211–225.
1973 *The Northern and Kaigani Haida: A study in photographic ethnohistory.* Unpublished Ph.D. Dissertation, Ohio State University, Columbus.
1990 Haida: Traditional culture. In *Handbook of North American Indians, Vol. 7: Northwest Coast,* ed. by W. Suttles (W. C. Sturtevant, gen. ed.). Smithsonian Institution, Washington. Pp. 240–260.

Blaise, Bertrand, John J. Clague, and Rolf W. Mathewes
1990 Time of maximum late Wisconsin Glaciation, west coast of Canada. *Quaternary Research 34:*282–295.

Blake, Michael, Gary Coupland, and Brian Thom
1993 Dating Scowlitz, *The Midden 25* (No. 1):7–9.

Boas, Franz
1897 The social organization and the secret societies of the Kwakiutl Indians. In *Report of the U. S. National Museum for 1895,* Washington. Pp. 311–738.
1902 Some problems in North American archaeology. *American Journal of Archaeology,* Second Series, *6:*1–6.

1916 Tsimshian mythology. In *31st Annual Report of the Bureau of American Ethnology*, 1909–1910, Smithsonian Institution, Washington. Pp. 29–1037.

Bobrowskey, P. T.

1988 Ice-free conditions in the north Canadian Cordillera at 18 ka and timing of the late Wisconsinan. *American Quaternary Association, Program and Abstracts*, 10th Biennial Meeting, p. 108.

1989 *Late Cenezoic glaciation of the northern Rocky Mountain trench, British Columbia.* Unpublished Ph. D. dissertation, University of Alberta, Edmonton.

Boehm, S. Gay

1973 *Cultural and non-cultural variation in the artifact and faunal samples from the St. Mungo Cannery site, DgRr 2.* Unpublished Master's thesis, University of Victoria.

Borden, Charles E.

1950 Preliminary report on archaeological investigations in the Fraser delta region. *Anthropology in British Columbia 1*:13–27.

1951 Facts and problems of Northwest Coast prehistory. *Anthropology in British Columbia 2*: 35–52.

1952a Results of archaeological investigations in central British Columbia. *Anthropology in British Columbia 3*:31–43.

1952b A uniform site designation for Canada. *Anthropology in British Columbia 3*:44–48.

1954 Some aspects of prehistoric coastal-interior relations in the Pacific Northwest. *Anthropology in British Columbia 4*:26–32.

1956 Results of two archaeological surveys in the east Kootenay region of British Columbia. *Research Studies of the State College of Washington 24*:73–104.

1960 DjRi3, an early site in the Fraser Canyon, British Columbia. In *Contributions to Anthropology 1957*, Anthropological Series 45, National Museum of Canada, Bulletin 162, Ottawa. Pp. 101–118.

1961 Fraser River archaeological project. *Anthropological Papers, 1.* National Museum of Canada, Ottawa.

1965 Radiocarbon and geological dating of the lower Fraser Canyon archaeological sequence. In *Proceedings Sixth Intern. Conf. Radiocarbon and Tritium Dating*, Pullman. Pp. 165–178.

1968a The prehistory of the lower mainland. In *Lower Fraser Valley: The evolution of a Cultural Landscape.* University of British Columbia Geographical Series No. 9, ed. by A. Siemens. Vancouver. Pp. 9–26.

1968b A late Pleistocene pebble tool industry of southwestern British Columbia. In *Early man in western North America*, ed. by C. Irwin-Williams. Eastern New Mexico University Contribution in Anthropology No. 1(4), Portales. Pp. 55–69.

1969 Early population movements from Asia into western North America. *Syesis 2*:1–13.

1970 Culture history of the Fraser delta region: An outline. In *Archaeology in B. C., New Discoveries*, ed. by Roy Carlson. *B. C. Studies*, Special Issue, 6–7. Pp. 95–112.

1975 *Origins and development of early Northwest Coast culture to about 3000 BC.* National Museums of Man, Mercury Series, Archaeological Survey of Canada Paper 45, Ottawa.

1976 A water saturated site on the southern mainland coast of British Columbia. In *The excavation of water-saturated sites (wet sites) on the Northwest Coast of North America* ed. by Dale Croes. National Museum of Man, Mercury Series, Archaeological Survey of Canada Paper No. 50, Ottawa. Pp. 234–260.

Borden, Charles E., and David Archer

1974 Archaeological salvage at Musqueam Northeast (DhRt 4), Vancouver, British Columbia. In *Archaeological salvage projects 1973*, compiled by W. J. Bryne. National Museum of Man, Mercury Series, Archaeological Survey of Canada Paper No. 50, Ottawa. Pp. 6–11.

Botkin, S.
1980 Effects of human exploitation on shellfish populations at Malibu Creek, California. In *Modelling change in prehistoric subsistence economies*, ed. by T. Earle and A. Christenson. Academic Press, New York. Pp. 121–136.

Boyd, Robert T.
1990 Demographic history, 1774–1874. In *Handbook of North American Indians, Vol. 7: Northwest Coast*, ed. by W. Suttles, (W. C. Sturtevant, gen. ed.). Smithsonian Institution, Washington. Pp. 135–148.

Brookfield, H. C.
1984 Intensification revisited. *Pacific Viewpoint 25(1)*:14–44.

Bryan, Alan L.
1957 Results and interpretations of recent archaeological research in western Washington with circum-boreal implications. *Davidson Journal of Anthropology 3(1)*:1–15.
1963 *An archaeological survey of northern Puget Sound.* Occasional Papers of the Idaho State University Museum 11, Pocatello.

Burley, David
1979a Specialization and the evolution of complex society in the Gulf of Georgia region. *Canadian Journal of Archaeology 3*:131–143.
1979b *Marpole: Anthropological reconstructions of a prehistoric Northwest Coast culture type.* Unpublished Ph. D. dissertation, Department of Archaeology, Simon Fraser University, Burnaby.
1980 *Marpole: Anthropological reconstructions of a prehistoric Northwest Coast culture type.* Simon Fraser University, Department of Archaeology, Publication No. 8, Burnaby.
1983 Cultural complexity and evolution in the development of coastal adaptations among the Micmac and Coast Salish. In *The evolution of maritime cultures on the Northeast and the Northwest Coasts of America*, ed. by Ronald Nash. Simon Fraser University, Department of Archaeology, Publication No. 11, Burnaby. Pp. 157–172.
1989 *Senewe'lets: Culture history of the Nanaimo Coast Salish and the False Narrows midden.* Royal British Columbia Museum Memoir No. 2. Victoria, B. C.

Burley, David, and Owen Beattie
1987 Coast Salish origins: Ethnicity and time depth in Northwest Coast prehistory. In *Ethnicity and culture*, ed. by Reginald Auger, Margaret Glass, Scott MacEachern, and Peter McCartney. The University of Calgary Archaeological Association, Calgary. Pp. 199–207.

Burley, David, and Christopher Knusel
1989 Burial patterns and archaeological interpretation: Problems in the recognition of ranked society in the Coast Salish region. In *Development of hunting-fishing-gathering maritime societies along the west coast of North America*, ed. by B. Onas. Reprint Proceedings, Vol. IIIC, the Circum-Pacific Prehistory Conference, Seattle, Washington, August 1–6, 1989. Washington State University Press, Pullman.

Butler, B. Robert
1961 Old Cordilleran Culture in the Pacific Northwest. *Occasional Papers of the Idaho State College Museum* No. 5, Pocatello.
1965 The structure and function of the Old Cordilleran culture concept. *American Anthropologist 67*:1120–1131.

Butler, Virginia L.
1990 *Distinguishing natural from cultural salmonid deposits in Pacific Northwest North America.* Unpublished Ph. D. dissertation, University of Washington, Seattle.
1993 Natural versus cultural Salmonid remains. Origin of the Dalles roadcut bones, Columbia River, Oregon, U. S. A. *Journal of Archaeological Science 20*:1–24.

Calvert, S. Gay

1968 The Co-op site: A prehistoric midden site on the northern Northwest Coast. Unpublished report, Laboratory of Archaeology, University of British Columbia, Vancouver.

1970 The St. Mungo Cannery site: A preliminary report. In *Archaeology in British Columbia: New discoveries*, ed. by R. Carlson. *BC Studies* Special Issue No. 6–7. Pp. 54–76.

1980 *A cultural analysis of faunal remains from three archaeological sites in Hesquiat Harbour, B. C.* Unpublished Ph. D. dissertation, University of British Columbia, Vancouver.

Calvert, S. Gay and Susan Crockford

1982 Analysis of faunal remains. Appendix IV. In *Alberni prehistory: Archaeological and ethnographic investigations on western Vancouver Island*, ed. by Alan McMillan and Denis St. Claire. Theytus Books and Alberni Valley Museum, Penticton and Port Alberni. Pp. 174–219.

Campbell, Sarah K.

1981 *The Duwamish No. 1 site: A lower Puget Sound shell midden.* University of Washington, Office of Public Archaeology, Research Report No. 1, Seattle.

Cannon, Aubrey

1991 *The economic prehistory of Namu.* Simon Fraser University, Department of Archaeology Publication No. 19, Burnaby.

Capes, Katherine H.

1964 Contributions to the prehistory of Vancouver Island. *Occasional Papers of the Idaho State University Museum 15*, Pocatello.

1977 Archaeological investigations of the Millard Creek site, Vancouver Island, British Columbia. *Syesis 10*:57–84.

Carlson, C.

1979 The early component at the Bear Cove Site, B. C. *Canadian Journal of Archaeology 3*: 177–194.

Carlson, Roy L.

1954 *Archaeological investigations in the San Juan Islands.* Unpublished Master's thesis, University of Washington, Seattle.

1960 Chronology and culture change in the San Juan Islands. *American Antiquity 25*: 562–586.

1970 Excavations at Helen Point on Mayne Island. In *Archaeology in British Columbia, new discoveries*, ed. by Roy Carlson, *B. C. Studies* Special Issue, No. 6–7. Pp. 113–125.

1972 Excavations at Kwatna. In *Salvage '71: Reports on salvage archaeology undertaken in British Columbia in 1971*, ed. by R. Carlson. Simon Fraser University, Department of Archaeology, Publication No. 1, Burnaby. Pp. 41–58.

1975 Early assemblages from the Helen Point Site. Paper presented at the 28th Annual Northwest Anthropological Conference, Seattle.

1979 The early period on the central coast of British Columbia. *Canadian Journal of Archaeology 3*:211–228.

1983a The far west. In *Early Man in the New World*, ed. by Richard Shutler, Sage Publications, Inc., Beverly Hills. Pp. 73–96.

1983b Prehistoric art of the central coast of British Columbia. In *Indian art traditions of the Northwest Coast*, ed. by R. Carlson. Simon Fraser University Archaeology Press, Burnaby. Pp. 121–129.

(Editor)

1983c *Indian art traditions of the Northwest Coast.* Simon Fraser University, Archaeology Press, Burnaby.

1984 Prehistoric trade in British Columbia: Obsidian. Paper presented at the B. C. Studies Conference, University of British Columbia, Vancouver.

1986 The 1985 Excavations at the Canal Site (DeRt 1 and DeRt 2). Report on file, Archaeology Branch, Victoria, B. C.

1987 Cultural and Ethnic Continuity on the Pacific Coast of British Columbia. Paper delivered at the 16th Congress of the Pacific Science Association, August, Seoul, Korea.

1988 The view from the North. In *Early human occupation in far western North America: The Clovis-Archaic interface*, ed. by Judith Willig, C. M. Aikens, and John Fagan. Nevada State Museum Anthropological Papers No. 21, Carson City, Nevada. Pp. 319–324.

1990a History of research in archaeology. In *Handbook of North American Indians, Vol. 7: Northwest Coast*, ed. by W. Suttles, (W. C. Sturtevant, gen. ed.). Smithsonian Institution, Washington. Pp. 107–115.

1990b Cultural antecedants. In *Handbook of North American Indians, Vol. 7: Northwest Coast*, ed. by W. Suttles, (W. C. Sturtevant, gen. ed.). Smithsonian Institution, Washington. Pp. 60–69.

1990c The 1986 Excavations at the Canal Site (DeRt 1 and DeRt 2). Report on file at the Archaeology Branch, Victoria.

1991a Namu periodization and C-14 chronology. In A. Cannon 1991, *The Economic Prehistory of Namu*. Appendix B. Pp. 85–95.

1991b The Northwest Coast before A. D. 1600. In *The North Pacific to 1600: Proceedings of the Great Ocean Conferences, Volume 1*. Oregon Historical Society, Portland. Pp. 109–136.

Carlson, Roy L., and Philip Hobler

1976 Archaeological survey of Seymour Inlet, Quatsino Sound, and adjacent localities. In *Current Research Reports*, ed. by R. Carlson, Simon Fraser University, Department of Archaeology Publication No. 3, Burnaby. Pp. 115–141.

Casteel, Richard

1976 Fish remains from Glenrose. In Matson (ed.) *The Glenrose Cannery Site*, National Museum of Man, Archaeological Survey of Canada, Mercury Series No. 52, Ottawa. Pp. 82–87.

Chapman, Margaret W.

1982 Archaeological investigations at the O'Connor site, Port Hardy. In *Papers on central coast archaeology*, ed. by Philip Hobler. Simon Fraser University, Department of Archaeology, Publication No. 10, Burnaby. Pp. 65–132.

Charlton, Arthur

1980 *The Belcarra Park site*. Simon Fraser University, Department of Archaeology, Publication No. 9, Burnaby.

Chatters, James C.

1989 The antiquity of economic differentiation within households in the Puget Sound region, Northwest Coast. In *Households and communities*, ed. by S. MacEachern, D. Archer, and R. Garvin. University of Calgary Archaeological Association, Calgary. Pp. 168–178.

Chisholm, Brian

1986 *Reconstruction of prehistoric diet in British Columbia using stable-carbon isotopic analysis*. Unpublished Ph. D. dissertation, Department of Archaeology, Simon Fraser University, Burnaby.

Christenson, Andrew

1980 Change in the human niche in response to population growth. In *Modelling change in prehistoric subsistence economies*, ed. by Timothy K. Earle and Andrew L. Christenson. Academic Press, New York. Pp. 31–72.

Clague, John
1983 Glacio-isostatic effects of the Cordilleran Ice Sheet, British Columbia, Canada. In *Shorelines and isostacy*, ed. by D. E. Smith and A. G. Dawson. Academic Press, San Diego. Pp. 321–346.

Clague, John, J. Harper, R. Hebda, and D. Howes
1982 Late Quaternary sea levels and Crustal Movements, Coastal British Columbia. *Canadian Journal of Earth Sciences 19*:597–618.

Clark, Donald W.
1981 Prehistory of the western subarctic. In *Handbook of North American Indians Vol. 6: Subarctic*, ed. by June Helm (W. C. Sturtevant, gen. ed.). Smithsonian Institution, Washington. Pp. 107–129.

Clark, J. G. D.
1975 *The earlier Stone Age: Settlement of Scandinavia*. Cambridge University Press, Cambridge.

Clark, Linda A.
1991 Archaeology of Seal Rock (35LNC14). In *Prehistory of the Oregon Coast*, ed. by R. Lee Lyman. Academic Press, San Diego. Pp. 175–240.

Clarke, Louise, and Arthur Clarke
1980 Zooarchaeological analysis of mollusc remains from Yuquot, British Columbia. In *The Yuquot project*, Vol. 2, ed. by W. J. Folan and J. Dewhirst. Canada, National Historic Parks and Sites Branch, History and Archaeology 43, Ottawa. Pp. 37–57.

Cohen, Barbara
1982 Abstract of *Western Indians* by Joseph Jorgensen. *American Antiquity 47*:250–251.

Connolly, Thomas J.
1992 *Human responses to change in coastal geomorphology and fauna on the southern Northwest Coast: Archaeological investigations at Seaside, Oregon*. University of Oregon Anthropological Papers 45, University of Oregon, Eugene.

Conover, K.
1978 Matrix analysis. In *Studies in Bella Bella prehistory*, ed. by J. Hester and S. Nelson. Simon Fraser University, Department of Archaeology, Publication No.5, Burnaby. Pp. 67–100.

Cook, Sherburne, and Robert F. Heizer
1968 Relationships among houses, settlement areas, and population in aboriginal California. In *Settlement archaeology*, ed. by K. C. Chang. Stanford University, Palo Alto. Pp. 79–116.

Coupland, Gary G.
1985a Household variability and status differentiation at Kitselas Canyon. *Canadian Journal of Archaeology 9*:39–56.
1985b *Prehistoric cultural change at Kitselas Canyon*. Unpublished Ph. D. dissertation, University of British Columbia, Vancouver.
1988a *Prehistoric cultural change at Kitselas Canyon*. Canadian Museum of Civilization, Mercury Series, Archaeological Survey of Canada Paper No. 138, Ottawa.
1988b Prehistoric economic and social change in the Tsimshian Area. In *Research in economic anthropology supplement 3: Prehistoric economies of the Pacific Northwest Coast*, ed. by Barry Isaac. JAI Press, Inc., Greenwich, CT. Pp. 211–243.
1989a Warfare and social complexity on the Northwest Coast. In *Cultures in conflict: Current archaeological perspectives*, ed. by D. Tkaczuk and B. Vivian, The Archaeological Association of the University of Calgary, Calgary. Pp. 205–214.
1989b The evolution of the prehistoric lower Skeena cultural system. *Development of hunting-fishing-gathering maritime societies on the Pacific: Part Two: Development of hunting-fishing-*

gathering societies along the West Coast of North America, ed. by A. Blukis Onat. Reprint Proceedings, Vol. IIIC, the Circum-Pacific Prehistory Conference, Seattle, Washington, August 1–6, 1989. Washington State University Press, Pullman.

1991 The Point Grey site: A Marpole spring village component. *Canadian Journal of Archaeology 15*: 73–96.

Coupland, Gary, C. Bissell, and S. King

1993 Prehistoric subsistence and seasonality at Prince Rupert Harbour: Evidence from the McNichol Creek site. *Canadian Journal of Archaeology 17*:59–73.

Cressman, Luther S. (in collaboration with David L. Cole, Wilbur A. Davis, Thomas M. Newman and Daniel J. Scheans)

1960 Cultural sequences at the Dalles, Oregon: A contribution to Pacific Northwest prehistory. *Transactions of American Philosophical Society, 50*, Pt. 10, Philadelphia.

Cressman, Luther S.

1977 *Prehistory of the Far West*. University of Utah Press, Salt Lake City.

Crockford, Susan

1991 Analysis of bird and mammal faunal remains from the 1989 excavations. In *1989 and 1990 Crescent Beach excavations, final report; The origins of the Northwest Coast ethnographic pattern: The place of the Locarno Beach phase*, R. G. Matson, Heather Pratt, and Lisa Rankin. Report on file at the Archaeology Branch, Victoria, and the Laboratory of Archaeology, University of British Columbia, Vancouver. Pp. 75–78.

Crockford, Susan, and Rebecca Wigen

1991 The fish from the 1989 and 1990 excavations and summary. In *1989 and 1990 Crescent Beach excavations, Final Report: The origins of the Northwest Coast ethnographic pattern: The place of the Locarno Beach phase*. R. G. Matson, Heather Pratt, and Lisa Rankin. Report on file at the Archaeology Branch, Victoria, and the Laboratory of Archaeology, University of British Columbia, Vancouver. Pp. 64–74.

Croes, Dale R. (Editor)

1976 *The excavation of water-saturated archaeological sites (wet sites) on the Northwest Coast of North America*. National Museum of Man, Mercury Series, Archaeological Survey of Canada Paper No. 50, Ottawa.

Croes, Dale R.

1987 Locarno Beach at Hoko River, Olympic Peninsula, Washington: Makah/Nootkan, Salishan, Chimakuan or Who? In *Ethnicity and culture*, ed. by R. Auger, M. F. Glass, S. MacEachean, and P. H. McCartney. Proceedings of the 18th Annual Chacmool Conference, Archaeological Association, University of Calgary, Calgary. Pp. 259–283.

1989a Prehistoric ethnicity on the Northwest Coast of North America: An evaluation of style in basketry and lithics. *Journal of Anthropological Archaeology* &101–130.

1989b Lachane basketry and cordage: A technical, functional and comparative study. *Canadian Journal of Archaeology 13*: 165–205.

1992a An evolving revolution in wet site research on the Northwest Coast of North American. In *The Wetland Revolution in Prehistory*, ed. by Bryony Coles. WARP Occasional Paper 6, University of Exeter. Pp. 99–111.

1992b Exploring prehistoric subsistence change on the Northwest Coast. In *Long-term subsistence change in prehistoric North America, Supplement 6, research in economic anthropology*, ed. by Dale R. Croes, Rebecca A. Hawkins, and Barry L. Isaac. JAI Press Inc., Greenwich CT. Pp. 337–366.

Croes, Dale R., and Eric Blinman (Editors)

1980 *Hoko River: A 2500 year old fishing camp on the Northwest Coast of North America*. Washington State University, Laboratory of Archaeology, Reports of Investigations No. 58, Pullman.

Croes, Dale R., and S. Hackenberger
1988 Hoko River archaeological complex: Modelling prehistoric Northwest Coast economic evolution. In *Research in economic anthropology supplement 3: Prehistoric economies of the Pacific Northwest Coast*, ed. by B. L. Isaac, JAI Press, Greenwich, CT. Pp. 19–85.

Curtin, A. Joanne
1991 Archaeological investigations at Tsawwassen, B. C., Volume III, human osteology. Report on file, Archaeology Branch, Victoria, B. C. Prepared by Arcas Consulting Archaeologists, Ltd. Port Moody, B. C.

Cybulski, Jerome S.
1973 British Columbia skeletal remains. *Canadian Archaeological Association Bulletin 5*: 126–27.
1978 An earlier population of Hesquiat Harbour, British Columbia: A contribution to Nootkan osteology and physical anthropology. British Columbia Provincial Museum, *Cultural Recovery Papers 1*, Victoria.
1990 Human biology. In *Handbook of North American Indians, Vol. 7: Northwest Coast*, ed. by W. Suttles, (W. C. Sturtevant gen. ed.). Smithsonian Institution, Washington. Pp. 52–59.
1991 Observations on Labret Wear, Appendix I. In *1989 and 1990 Crescent Beach excavations, final report: The origins of the Northwest Coast ethnographic pattern: The place of the Locarno Beach phase*, R. G. Matson, Heather Pratt, and Lisa Rankin. Report on file at the Archaeology Branch, Victoria, and the Laboratory of Archaeology, University of British Columbia, Vancouver.
1992 *A Greenville burial ground*. Canadian Museum of Civilization, Mercury Series, Archaeological Survey of Canada Paper 146, Ottawa.

Dahrendorf, Ralf
1959 *Class and class conflict in industrial society*, Stanford University Press, Palo Alto, CA.

Daugherty, Richard
1948 Survey of the Washington Coast from Cape Flattery to Cape Disappointment. Manuscript on file Department of Anthropology, University of Washington, Seattle.
1956 Archaeology of the Lind Coulee site, Washington. *Proceedings of the American Philosophical Society 100(3)*:223–278.

Davis, Stanley (Editor)
1989 *The Hidden Falls site, Baranof Island, Alaska*. Alaska Anthropological Association Monograph Series, Brockport.

Davis, Stanley
1990 Prehistory of southeastern Alaska. In *Handbook of North American Indians, Vol. 7: Northwest Coast*, ed. by W. Suttles, (W. C. Sturtevant gen. ed.). Smithsonian Institution, Washington. Pp. 197–202.

Davis, Kingsley, and Wilbert E. Moore
1945 Some principles of stratification. *American Sociological Review 10* (Reprinted in *Structured Social Inequality, second Ed.*, ed. by Celia Heller, 1987). Macmillan, New York.

Deans, James
1891 Burial mounds of Vancouver Island and their relics. *American Antiquarian and Oriental Journal 13*:171–72.
1892 The antiquities of British Columbia. *American Antiquarian and Oriental Journal 14*: 41–44.

Deetz, James
1967 *Invitation to archaeology*. The Natural History Press, Garden City, New York.

de Laguna, Frederica

1934 *The archaeology of Cook Inlet, Alaska.* University of Pennsylvania Museum Press, Philadelphia.

1956 Chugash prehistory: The archaeology of Prince William Sound, Alaska. *University of Washington Publications in Anthropology, No. 13,* Seattle.

1960 The story of a Tlingit community (Angoon): A problem in the relationship between archaeological, ethnological and historical methods. *Bureau of American Ethnology, Bulletin 172,* Washington.

1972 *Under Mount St. Elias: The history and culture of the Yakutat Tlingit.* 3 Pts. Smithsonian Institution, Washington.

1977 *Voyage to Greenland: A personal initiation into anthropology.* Norton, New York.

de Laguna, Frederica, Francis A. Riddell, Donald F. McGeein, Kenneth S. Lane, J. Arthur Freed, and Carolyn Osborne

1964 Archeology of the Yakutat Bay Area, Alaska. *Bureau of American Ethnology Bulletin 192,* Washington.

Dewhirst, John

1980 *The indigenous archaeology of Yuquot, a Nootkan outside village: The Yuquot Project, Volume 1,* ed. by W. J. Folan and J. Dewhirst. Canada, National Historic Parks and Sites Branch, History and Archaeology 39, Ottawa.

Dikov, Nikolai

1979 *Drevnie kultury Severo-Vostochnoi Azii.* Nauka, Moscow.

Dillehay, Tom D.

1984 A late Ice-Age settlement in southern Chile. *Scientific American 241:*106–117.

1989 Paleoenvironment and site context. *Monte Verde: A late Pleistocene settlement in Chile,* Vol. I. Smithsonian Institute Press, Washington D. C.

Dillehay, Tom D., and Michael B. Collins

1991 Monte Verde, Chile: a comment on Lynch. *American Antiquity 56:*333–341.

Donald, Leland

1983 Was Nuu-chah-nulth-aht (Nootka) society based on slave labor? In *The development of political organization in native North America,* ed. by E. Tooker. Proceedings of the American Ethnological Society, 1979. Pp. 108–119.

1985 On the possibility of social class in societies based on extractive subsistence. In *Status, structure and stratification: Current archaeological reconstructions,* ed. by M. Thompson, M. T. Garcia, and F. Kense. University of Calgary Archaeological Association, Calgary. Pp. 237–244.

1990 Liberty, equality, fraternity: Was the Indian really egalitarian? In *The invented Indian: Cultural fictions and government policies,* ed. by James Clifton. Transaction Publishers, New Brunswick, N. J. Pp. 145–167.

Donald, Leland, and Donald Mitchell

1975 Some correlates of local group rank among the southern Kwakiutl. *Ethnology 14:* 325–346.

Draper John A.

1988 *A proposed model of late prehistoric settlement systems on the southern Northwest Coast, Coos and Curry counties, Oregon.* Unpublished Ph. D. dissertation, Department of Anthropology, Washington State University, Pullman.

Drucker, Philip

1943 Archaeological survey on the northern Northwest Coast. *Bureau of American Ethnology Bulletin 133,* 17–132. Smithsonian Institution, Washington.

1950 Culture element distributions, XXVI: Northwest Coast. *University of California Anthropological Records 9(3):*157–294.

1951 The northern and central Nootkan Tribes. *Bureau of American Ethnology Bulletin 144.* Smithsonian Institution Press, Washington.

1955 *Indians of the Northwest Coast.* The Natural History Press, New York.

1958 Sources of Northwest Coast culture. In *New interpretations of aboriginal American culture history*, ed. by Betty Meggers. Anthropological Society of Washington, Washington, D. C. Pp. 59–81.

1965 *Cultures of the north Pacific coast.* Chandler Publishing Co., San Francisco.

Drucker, Philip, and Robert F. Heizer

1967 *To make my name good: A reexamination of the southern Kwakiutl potlatch.* University of California Press, Berkeley.

Duff, Wilson

1952 The Upper Stalo Indians of the Fraser Valley, British Columbia. *Anthropology in British Columbia. Memoirs 1.* Victoria.

1956 Unique stone artifacts from the Gulf Islands. In *Provincial Museum of Natural History and Anthropology. Report for the year 1955.* Victoria, B. C. Pp. 45–55.

1963 Stone clubs of the Skeena River area. *Provincial Museum Annual Report for 1962.* British Columbia Provincial Museum, Victoria, B. C. Pp. 2–12.

1981 The world is as sharp as a knife: Meaning in northern Northwest Coast art. In *The world is as sharp as a knife*, ed. by D. Abbott. British Columbia Provincial Museum, Victoria. Pp. 209–224.

1983 The world is as sharp as a knife: Meaning in northern Northwest Coast art. In *Indian art traditions of the Northwest Coast*, ed. by Roy Carlson. Simon Fraser University, Archaeology Press, Burnaby. Pp. 47–66.

Duff, Wilson, and Michael Kew

1958 Anthony Island: A home for the Haidas. In *British Columbia Provincial Museum of Natural History and Anthropology, Report for the year 1957.* Victoria, B. C. Pp. 37–64.

Dyen, Isidore, and David F. Aberle

1974 *Lexical reconstruction: The case of the proto-Athapaskan kinship system.* Cambridge University Press, Cambridge.

Dyson-Hudson, Rada, and Eric Smith

1978 Human territoriality: An ecological reassessment. *American Anthropologist 80*:21–41.

Eells, Myron

1886 The Stone Age of Oregon. *Annual report of the Smithsonian Institution for 1885.* Pp. 283–295. Washington.

Eldridge, Morley

1987 Mitigative Excavation at DiSe 10, Denman Island, B. C.: Rockshelters and Blufftop Hunting Magic. Report on file, Archaeology Branch, Victoria, B. C.

Ellen, Roy

1982 *Environment, settlement, and subsistence, the ecology of small-scale systems.* Cambridge University Press, Cambridge.

Erlandson, Jon M.

1989 Faunal analysis of invertebrate assemblage. In *The Hidden Falls Site, Baranof Island, Alaska*, ed. by. S. D. Davis. Alaska Anthropological Association Monograph Series, Brockport. Pp. 131–158.

Fedje, Daryl

1993 *Sea-levels and prehistory in Gwaii Haanas.* Unpublished Master's thesis, University of Calgary, Calgary.

Fladmark, Knut

1970a A preliminary report on lithic assemblages from the Queen Charlotte Islands, British Columbia. In *Early man and environments in northwestern North America*, ed.

by R. A. Smith and J. W. Smith. University of Calgary: Students' Press, Calgary. Pp. 117–36.

1970b Preliminary report on the archaeology of the Queen Charlotte Islands. In *Archaeology in B. C., New Discoveries*, ed. by Roy Carlson. *B. C. Studies* Special Issue No. 6–7. Pp. 18–45.

1971 Radiocarbon dates from the Queen Charlotte Islands. *The Midden 3*:11–15.

1973 The Richardson Ranch site: A 19th century Haida house. In *Historical archaeology in northwestern North America*, ed. by R. Getty and K. Fladmark. University of Calgary Archaeological Association, Calgary. Pp. 53–95.

1975 *A paleoecological model for Northwest Coast prehistory.* National Museum of Man, Mercury Series, Archaeological Survey of Canada Paper No. 43, Ottawa.

1979 The early prehistory of the Queen Charlotte Islands. *Archaeology 32*:38–45.

1982 An introduction to the prehistory of British Columbia. *Canadian Journal of Archaeology 6*:95–156.

1983 Times and places: Environmental correlates of mid-to-late Wisconsinan human population expansion in North America. In *Early man in the New World*, ed. by Richard Shutler, Jr. Sage Publications, Beverly Hills. Pp. 13–41.

1986a Lawn Point and Kasta: Microblade sites on the Queen Charlotte Islands, British Columbia. *Canadian Journal of Archaeology 10*:37–58.

1986b *British Columbia prehistory.* National Museums of Canada, National Museum of Man, Ottawa.

1989 The Native culture history of the Queen Charlotte Islands. In *The Outer Shores*, ed. by G. G. E. Scudder and Nicholas Gessler, Queen Charlotte Islands Museum Press, Skidegate. Pp. 199–221.

Fladmark, Knut R., Jonathan Driver, and Diana Alexander

1988 The Paleoindian component at Charlie Lake Cave (HbRf 39), British Columbia. *American Antiquity 53*:371–384.

Fladmark, Knut R., Kenneth Ames, and Patricia Sutherland

1990 Prehistory of the northern coast of British Columbia. In *Handbook of North American Indians, Vol. 7: Northwest Coast*, ed. by W. Suttles (W. C. Sturtevant gen. ed.). Smithsonian Institution, Washington. Pp. 229–239.

Flenniken, Jeffrey

1980 Systems analysis of the lithic artifacts. In *Hoko River: A 2500 year old fishing camp on the Northwest Coast of North America*, ed. by Dale Croes and Eric Blinman. Washington State University. Laboratory of Archaeology, Reports of Investigations No. 58, Pullman. Pp. 290–307.

1981 *Replicative systems analysis: A model applied to the vein quartz artifacts from the Hoko River site.* Washington State University, Laboratory of Anthropology, Reports of Investigations, No. 59, Pullman.

Fried, Morton

1967 *The evolution of political society: An essay in political anthropology.* Random House, New York.

Garfield, Viola

1939 Tsimshian clan and society. *University of Washington Publications in Anthropology No. 7(3)*: 167–340.

1951 The Tsimshian and their neighbors. In *The Tsimshian Indians and their arts*, ed. by V. Garfield and P. Wingert. Douglas and McIntyre, Vancouver. Pp. 3–70.

Gaston, Jeanette L.

1975 *The extension of the Fraser delta cultural sequence into northwest Washington.* Unpublished Master's thesis, Western Washington State College, Bellingham.

Ghiselin, Michael T.
1969 *The triumph of the Darwinian method.* University of California Press, Berkeley.

Gilman, Antonio
1981 The development of social stratification in Bronze Age Europe. *Current Anthropology* 22:1–23.

Gleeson, Paul, and Gerald Grosso
1976 Ozette site. In *The excavation of water-saturated archaeological sites (wet sites) on the Northwest Coast of North America*, ed. by Dale Croes. National Museum of Man Mercury Series, Archaeological Survey of Canada, Paper No. 50, Ottawa. Pp. 13–45.

Godfrey-Smith, D.
1984 Obsidian X-ray fluorescence analysis of five samples from the Paul Mason Site. Report on file, Laboratory of Archaeology, University of British Columbia, Vancouver.

Goebel, Ted, Roger Powers, and Nancy Bigelow
1991 The Nenana Complex of Alaska and Clovis origins. In *Clovis: Origins and Adaptations*, ed. by Robson Bonnichsen and Karen L. Turnmire. Center for the Study of the First Americans, Corvallis, Oregon. Pp. 49–79.

Gould, Richard A.
1966 *Archaeology of the Point St. George site, and Tolowa prehistory.* University of California Publication in Anthropology Vol. 4, University of California Press, Berkeley.
1978 Tolowa. In *Handbook of North American Indians, Vol. 8: California*, ed. by R. F. Heizer (W. C. Sturtevant gen. ed.). Smithsonian Institution, Washington. Pp. 128–136.
1980 *Living archaeology.* Cambridge University Press, Cambridge.

Grabert, Garland
1979 Pebble tools and time factoring. *Canadian Journal of Archaeology* 3:165–175.

Grabert, Garland, and Curtis Larson
1975 Marine transgressions and cultural adaptations: Preliminary tests of an environmental model. In *Prehistoric maritime adaptations in the circumpolar zone*, ed. by W. Fitzhugh. Mouton, The Hague. Pp. 229–251.

Greenberg, Joseph H.
1987 *Language in the Americas.* Stanford University Press, Palo Alto, CA.

Greenberg, Joseph H., C. G. Turner II, and S. L. Zegura
1986 The settlement of the Americas: A comparison of the linguistic, dental and genetic evidence. *Current Anthropology* 27:477–497.

Greengo, Robert E.
1970 Excavations at the Marymoor Site. Manuscript in possession of the author.

Greengo, Robert E. (Editor)
1983 *Prehistoric places on the southern Northwest Coast.* Thomas Burke Memorial Washington State Museum, University of Washington, Seattle.

Guinn, Stanley, J.
1962 White Rock Village archaeological site: A preliminary report of investigations. *Washington State University, Laboratory of Anthropology, Reports of Investigations No. 16*, Pullman.
1963 A maritime village on the Olympic Peninsula of Washington. *Washington State University, Laboratory of Anthropology. Reports of Investigations No. 22*, Pullman.

Gunther, Erna
1972 *Indian life on the Northwest coast of North America, as seen by the early explorers and fur traders during the last decades of the eighteenth century.* University of Chicago Press, Chicago.

Hadleigh-West, Frederick
1967 The Donnelly Ridge site and the definition of an early core and blade complex in Central Alaska. *American Antiquity* 32:360–382.

Haggarty, James C.
1982 *The archaeology of Hesquiat Harbour: The archaeological utility of an ethnographically defined social unit.* Unpublished Ph. D. dissertation, Washington State University, Pullman.

Haggarty, James C., and John Sendey
1976 Test excavations at Georgeson Bay, British Columbia, *British Columbia Provincial Museum Occasional Paper 19.* Victoria B. C.

Haley, Shawn D.
1983 The South Yale site: Yet another point. *The Midden :15(5)*:3–5.

Hall, Roberta L., and James C. Haggarty
1981 Human skeletal remains and associated cultural material from the Hill Site, DfRu 4, Saltspring Island, British Columbia. In *Contributions to Physical Anthropology, 1978–1980,* ed. by J. S. Cybulski. National Museum of Man Mercury Series, Archaeological Survey of Canada Paper No. 106, Ottawa. Pp. 64–106.

Halpin, Marjorie, and Margaret Seguin
1990 Tsimshian peoples: Southern Tsimshian, Coast Tsimshian, Nishga, and Gitksan. In the *Handbook of North American Indians, Volume 7: Northwest Coast,* ed. by W. Suttles, (W. C. Sturtevant, gen. ed.). Smithsonian Institution, Washington. Pp. 267–285.

Ham, Leonard C.
1976 Analysis of shell samples from Glenrose. In *The Glenrose Cannery Site,* ed. by R. G. Matson. National Museum of Man, Archaeological Survey of Canada, Mercury Series No. 52, Ottawa. Pp. 42–78.
1980 The Beach Grove archaeological Heritage Complex: A concept plan for a Heritage Park and Interpretive Centre at Tswawwassen, B. C. Report on file at the Heritage Conservation Branch, Victoria.
1982 *Seasonality, shell midden layers, and Coast Salish subsistence activities at the Crescent Beach Site, DgRr 1.* Unpublished Ph. D. dissertation, University of British Columbia, Vancouver.
1990 The Cohoe Creek site: A Late Moresby Tradition Shell Midden. *Canadian Journal of Archaeology 14*:199–221.

Ham, Leonard C., and C. Moira Irvine
1975 Techniques for determining seasonality of shell middens from marine mollusc remains. *Syesis 8*:363–373.

Ham, Leonard, Arlene Yip, Leila Kullar, and Debbie Cannon
1986 *A Charles culture fishing village.* Report on file, Heritage Conservation Branch, Victoria.

Hanson, Diane
1990 Prehistoric subsistence at the Pender Canal sites and the surrounding area. *Northwest Anthropological Research Notes 24*:195–212.

Hanson, Gordon W.
1973 *The Katz site: A prehistoric pithouse settlement in the lower Fraser Valley, British Columbia.* Unpublished Master's thesis, University of British Columbia, Vancouver.

Hart, John L.
1973 *Pacific fishes of Canada.* Fisheries Research Board of Canada Bulletin 180, Ottawa.

Haury, Emil
1975 *Ventana Cave* (Second Printing). University of Arizona Press, Tucson.

Hayden, Brian
1977 Sticks and stones and ground-edge axes: The Upper Paleolithic in Southeast Asia. In *Sundra and Sahul: Prehistoric studies in Southeast Asia, Melanesia and Australia,* ed. by J. Allen, Jack Golson, and Rhys Jones. Academic Press, New York. Pp. 73–109.

1981 Research and development in the Stone Age: Technological transitions among hunter-gatherers. *Current Anthropology* 22:519–548.

1989 From chopper to celt: The evolution of resharpening techniques. In *Time, energy and stone tools*, ed. by R. Torrence. Cambridge University Press, Cambridge. Pp. 7–16.

1990 Nimrods, piscators, pluckers, and planters: The emergence of food production. *Journal of Anthropological Archaeology* 9:31–69

(Editor)

1992 *A complex culture of the British Columbia Plateau.* University of British Columbia Press, Vancouver.

1992a Conclusion: Ecology and complex hunter/gatherers. In *A complex culture of the British Columbia Plateau*, ed. by B. Hayden. University of British Columbia Press, Vancouver. Pp. 525–563.

Hayden, Brian, and Rob Gargett

1990 Big Man, Big Heart? A Mesoamerican view of the emergence of complex society. *Ancient Mesoamerica* 1:3–20.

Haynes, C. Vance

1982 Were Clovis progenitors in Bergingia? In *Paleoecology of Beringia*, ed. by D. M. Hopkins, J. V. Matthews, Jr., C. E. Schweger, and S. B. Young. Academic Press, New York. Pp. 383–398.

1987 Clovis origins update. *The Kiva* 52:83–93.

1991 Geoarchaeological and paleohydrological evidence for a Clovis-age drought in North America and its bearing on extinction. *Quaternary Research* 35:438–450.

Hebda, Richard J.

1977 *The Paleoecology of a raised bog and associated deltaic sediments of the Fraser Delta.* Unpublished Ph. D. dissertation, University of British Columbia, Vancouver.

Hebda, Richard, and S. Gay Frederick

1990 History of marine resources of the northeast Pacific since the last glaciation. *Transactions of the Royal Society of Canada, Sixth Series, Volume 1*, 319–342.

Hebda, Richard, and Rolf Mathewes

1984 Holocene history of cedar and native Indian cultures of the North American Pacific coast. *Science 225(4663)*:711–713.

Heizer, Robert F.

1963 Foreword. In the Fourth Printing of *Cultural and Natural areas of North America* by Alfred L. Kroeber. Pp. v–ix.

Henry, Donald O.

1989 *From foraging to agriculture: The Levant at the end of the Ice Age.* University of Pennsylvania Press, Philadelphia.

Hester, James J., and Sarah M. Nelson (Editors.)

1978 *Studies in Bella Bella prehistory.* Simon Fraser University, Department of Archaeology, Publication No. 5, Burnaby.

Heusser, C.

1960 *Late Pleistocene environments of north Pacific North America.* American Geographical Society Special Publication No. 35. Washington.

Hill, James N.

1966 A Prehistoric community in eastern Arizona. *Southwestern Journal of Anthropology* 22:9–31.

Hill-Tout, Charles

1895 Later prehistoric man in British Columbia. *Transactions of the Royal Society of Canada*, 2nd series, *1(2)*:103–122, Ottawa.

1948 The great Fraser midden. In *The great Fraser midden.* Vancouver Art, Historical and Scientific Association, Vancouver. Pp. 8–15.

Hobler, Philip M.

1970 Archaeological survey and excavations in the vicinity of Bella Coola. In *Archaeology in British Columbia: New Discoveries,* ed. by R. L. Carlson. *BC Studies* Special Issue 6–7. Pp. 77–94.

1972 Archaeological work at Kimsquit: 1971. In *Salvage '71: Reports on salvage archaeology undertaken in British Columbia in 1971,* ed. by R. L. Carlson. Simon Fraser University, Department of Archaeology Publication No.1, Burnaby. Pp. 85–106.

1983 Settlement location determinants: An explanation of some Northwest Coast data. In *The evolution of maritime cultures on the Northeast and Northwest Coasts of America,* ed. by R. Nash. Simon Fraser University, Department of Archaeology, Publication No. 11, Burnaby. Pp. 149–156.

1990 Prehistory of the Central Coast of British Columbia. In the *Handbook of North American Indians Vol. 7: Northwest Coast,* ed. by W. Suttles, (W. C. Sturtevant, gen. ed.). Smithsonian Institution, Washington. Pp.298–305.

Hoffecker, John F., W. Roger Powers, and Ted Goebel

1993 The colonization of Beringia and the peopling of the New World. *Science 259*:46–53 (1 January 1993).

Holm, Margaret

1990 *Prehistoric Northwest Coast art: A stylistic analysis of the archaeological record.* Unpublished Master's thesis, Department of Anthropology and Sociology, University of British Columbia, Vancouver.

Hopkins, David M.

1982 Aspects of the paleogeography of Beringia During the late Pleistocene. In *Paleoecology of Beringia,* ed. by D. M. Hopkins, J. V. Matthews, Jr., C. E. Schweger, and S. B. Young. Academic Press, New York. Pp 3–28.

Hopkins, David M., John V. Matthews, Jr., Charles E. Schweger, and Steven B. Young, Jr. (Editors)

1982 *Paleoecology of Beringia,* Academic Press, New York.

Howes, Donald W.

1982 *Spatial analysis at a Northwest Coast fishing camp: The Hoko River site.* Unpublished Master's thesis, Department of Anthropology, Washington State University, Pullman.

Huelsbeck, David R.

1988 The surplus economy of the central Northwest Coast. In *Research in economic anthropology supplement 3: Prehistoric economies of the Pacific Northwest Coast,* ed. by B. L. Isaac. JAI Press, Greenwich, CT. Pp. 149–177.

1989 Food consumption, resource exploitation and relationships within and between households at Ozette. In *Households and Communities,* ed. by S. MacEachern, D. Archer, and R. Garvin. University of Calgary Archaeological Association, Calgary. Pp. 157–167.

Idler, D. R. and Clemens, W. A.

1959 The energy expenditures of Fraser River sockeye during the spawning migration. *International Pacific Salmon Fisheries Commission, Progress Report No. 6,* New Westminister, B. C.

Imamoto, S.

1976 An analysis of the Glenrose faunal remains. In *The Glenrose Cannery Site,* ed. by. R. G. Matson. National Museum of Man, Archaeological Survey of Canada, Mercury Series No. 52, Ottawa. Pp. 21–41.

Inglis, Richard
1974 Contract research. In *Archaeological survey of Canada, annual review 1973*, ed. by G. MacDonald. National Museum of Man, Mercury Series, Archaeological Survey of Canada Paper No. 21, Ottawa. Pp. 27–30.
1976 'Wet' site Distribution—the Northern case: GbTo 33, the Lachane site. In *The excavation water-saturated archaeological sites (wet sites) on the Northwest Coast of North America*, ed. by Dale Croes. National Museum of Man, Mercury Series, Archaeological Survey of Canada Paper No. 50, Ottawa. Pp. 158–185.

Irvine, C. Moira
1973 Report on salvage excavation at the South Yale Site (DjRi 7). Report on file, Heritage Conservation Branch, Victoria and Laboratory of Archaeology, University of British Columbia.

Isaac, Barry L.
1988 Introduction. In *Research in economic anthropology supplement 3: Prehistoric economies of the Pacific Northwest Coast*, ed. by B. L. Isaac. JAI Press, Greenwich, CT. Pp. 1–16.

Ives, John
1987 The Tsimshian are carrier. In *Ethnicity and culture*, Proceedings of the 18th annual Chacmool Conference, ed. by R. Auger, M. Glass, S. MacEachern, and P. McCartney. University of Calgary Archaeological Association, Calgary. Pp. 209–225.

Jelinek, Arthur J.
1992 Perspectives from the Old World on the habitation of the New. *American Antiquity 57*: 345–347.

Jewitt, John R.
1975 *Narrative of the adventures and sufferings of John R. Jewitt while held as a captive of the Nootka Indians of Vancouver Island*, 1803–1805, ed. by R. F. Heizer. Ballena Press, Ramona, CA.

Johnson, Allen W. and Timothy K. Earle
1987 *The evolution of human societies: From foraging group to agrarian state*. Stanford University Press, Palo Alto, CA.

Johnstone, Dave
1991 *The function(s) of a shell midden site from the southern Strait of Georgia*. Unpublished Master's thesis, Department of Archaeology, Simon Fraser University, Burnaby.

Jorgensen, Joseph G. (Editor)
1974 *Comparative studies by Harold E. Driver and essays in his honor*. Human Relations Area Files Press, New Haven, CT.

Jorgensen, Joseph
1980 *Western Indians*. W. H. Freeman and Co., San Franciso.

Keen, Sharon D.
1975 The growth rings of clam shells from two Pentlatch middens as indicators of seasonal gathering. *Heritage Conservation Branch Occasional Paper No. 3*, Victoria, B. C.

Kendall, D. G.
1971 Seriation from abundance matrices. In *Mathematics in the Archaeological and Historical Sciences*, ed. by F. R. Hodson, D. G. Kendall, and P. Tautu. Edinburgh University Press, Edinburgh. Pp. 215–252.

Kenny, Ray A.
1974 *Archaeological investigations at the Willows Beach site, Southeastern Vancouver Island*. Unpublished Master's thesis, University of Calgary.

Kew, Michael
1992 Salmon availability, technology, and cultural adaptation in the Fraser River Watershed. In *A complex culture of the British Columbia Plateau*, ed. by B. Hayden. Pp. 177–221.

Kidd, Robert S.
1964 A synthesis of western Washington prehistory from the perspective of three occupation sites. Unpublished Master's thesis, Department of Anthropology, University of Washington, Seattle.
1967 The Martin site, southwestern Washington. *Tebiwa: Journal of the Idaho State University Museum 10(2)*:13–38.
1969 The archaeology of the Fossil Bay site, Sucia Island, Northwestern Washington state, in relation to the Fraser delta sequence. *Paper No. 2, Contributions to anthropology VII: Archaeology, National Museums of Canada, Bull. 232*, Ottawa.

Kidder, Alfred V.
1924 *An introduction to the study of Southwestern Archaeology, with a preliminary account of the excavations at Pecos.* Papers of the Southwest Expedition 1 (Yale University Press reprint, New Haven, 1962).

King, Arden R.
1950 *Cattle Point: A stratified site on the southern Northwest Coast.* Memoirs of the Society for American Archaeology 7, Menasha.

Kirch, Patrick
1984 The archaeological study of adaptation: Theoretical and methodological issues. In M. B. Schiffer (ed.) *Advances in archaeological method and theory, selections for students from Volumes 1 through 4.* Academic Press, New York. Pp. 101–156.

Kornbacher, Kimberly
1989 *Shell midden lithic technology: An investigation of change at British Camp (45SJ24), San Juan Island.* Unpublished Master's thesis, Department of Anthropology and Sociology, University of British Columbia, Vancouver.

Kroeber, Alfred L.
1923 American culture and the Northwest Coast. *American Anthropologist 25*:1–20.
1939 *Cultural and natural areas of native North American.* University of California Publications in American Archaeology Ethnology, Vol. 32, Berkeley.

Kruskal, J. B.
1964 Multidimensional scaling by optimizing goodness of fit to a nonmetric hypothesis. *Psychometrika 29*:1–27.

Larsen, Curtis
1971 *An investigation into the relationship of change in relative sea level to social change in the prehistory of Birch Bay, Washington.* Unpublished Master's thesis, Western Washington State College, Bellingham.

Larsen, Curtis, and Garland Grabert
1975 Maritiime transgressions and cultural adaptation: Preliminary test of an environmental model. In *Prehistoric maritime adaptations of the circumpolar zone*, ed. by G. Quimby and R. Casteel. Aldine, Chicago. Pp. 229–254.

Leatherman, K. E., and A. D. Krieger
1940 Contributions to Oregon coast prehistory. *American Antiquity 6*:19–28.

LeClair, Ronald
1976 Investigations at the Maurer site near Agassiz. In *Current research reports*, ed. by R. Carlson. Simon Fraser University, Department of Archaeology, Publication No. 3, Burnaby. Pp. 33–42.

Lee, Richard B.
1979 *The !Kung San.* Cambridge University Press, Cambridge.

Lee, Richard B., and Irven DeVore (Editors)
1968 *Man the Hunter.* Aldine, Chicago.

Legros, Dominique

1981 *Structure socio-culturelle et rapports demomination chez les Tutchone septentrionaux du Yukon au XIXe siècle.* Unpublished Ph. D. dissertation, Department of Anthropology and Sociology, University of British Columbia.

1982 Reflexions sur l'origine des inequalités à partir du cas de Athapaskan Tutchone. *Culture* 2:65–84.

1985 Wealth, poverty and slavery among the 19th century Tutchone Athapaskans. *Research in Economic Anthropology* 7:37–64.

Lenski, Gerhard, and Jean Lenski

1985 *Human societies: An introduction to macrosociology.* (Fifth Edition). McGraw-Hill, New York.

Leonhardy, Frank C.

1975 The lower Snake River culture typology—1975, Leonhardy and Rice Revisited. Abstract of paper presented at 28th Annual Meeting, Northwest Anthropological Conference. *Northwestern Anthropological Research Notes 10*: 61.

Leonhardy, Frank C., and David G. Rice

1970 A proposed culture typology for the lower Snake River region, southeastern Washington. *Northwestern Anthropological Research Notes* 4:1–29.

Lightfoot, Kent

1985 Shell midden diversity: A case example from coastal New York. *North American Archaeologist* 6:289–324.

Lightfoot, Ricky Ray

1983 *Component 2 at the Hidden Falls archaeological site, southeastern Alaska.* Unpublished Master's thesis, Department of Anthropology, Washington State University, Pullman.

1989 Cultural Component II. In *The Hidden Falls site, Baranoff Island, Alaska*, ed. by Stanley Davis. Alaska Anthropological Association Monograph Series, Brockport. Pp. 199–273.

Liverman, D. G. E.

1989a The Laurentide ice sheet in west-central Alberta—Implications for the ice free corridor. *Canadian Quaternary Association Program and Abstracts*, 36.

1989b *The Quaternary geology of the Grande Prairie area, Alberta.* Unpublished Ph.D. dissertation, University of Alberta, Edmonton.

Liverman, D. G. E., N. R. Catto, and N. W. Rutter

1989 Laurentide glaciation in west-central Alberta: a single (Late Wisconsinan) event. *Canadian Journal of Earth Sciences 26*:266–274.

Long, Austin, and Bruce Rippeteau

1974 Testing contemporaneity and averaging radiocarbon dates. *American Antiquity 39*: 205–215.

Longacre, William

1964 Archaeology as anthropology: A case study. *Science 144*:1454–1455.

Luebbers, Roger

1978 Excavations: Stratigraphy and artifacts. In *Studies in Bella Bella prehistory*, ed. by James J. Hester and Sarah M. Nelson. Simon Fraser University, Department of Archaeology Publication No. 5, Burnaby. Pp. 11–66.

Lyman, R. Lee

1991 *Prehistory of the Oregon coast: The effects of excavation strategies and assemblage size on archaeological inquiry.* Academic Press, San Diego.

Lyman, R. Lee, and Ann C. Bennett

1991 Discussion (Archaeology of Whale Cove). In *Prehistory of the Oregon Coast: The effects of excavation strategies and assemblage size on archaeological inquiry*, ed. by R. Lee Lyman. Academic Press, San Diego. Pp. 276–277.

Lyman, R. Lee, and Richard Ross
1988 Oregon coast prehistory: A critical history and a model. *Northwest Anthropological Research Notes* 22:67–119.

Lynch, Thomas F.
1990 Glacial-age man in South America? A critical review. *American Antiquity* 55:12–36.

McAllister, Nancy M.
1980 Avian fauna from the Yuquot Excavation. In *The Yuquot project, volume 2*, ed. by W. J. Folan and J. Dewhirst. Canada, National Historic Parks and Sites Branch, History and Archaeology 43, Ottawa. Pp. 103–174.

McIlwraith, Thomas F.
1948 *The Bella Coola Indians*. University of Toronto Press, Toronto.

McMillan, Alan, and Denis St. Claire
1982 *Alberni prehistory: Archaeological and ethnographic investigations on western Vancouver Island*. Theytus Books and Alberni Valley Museum, Penticton and Port Alberni.
1991 The Toquaht archaeological project: Report on the 1991 field season. Report on file, Archaeology Branch, Victoria, B. C.

McMurdo, A.
1976 Excavations at the Maple Bank Site: DcRu 12. Report on File, Heritage Conservation Branch, Victoria, B. C.

McMurdo, John
1974 *The archaeology of Helen Point, Mayne Island*. Unpublished Master's thesis, Department of Archaeology, Simon Fraser University, Burnaby.

McNeary, S.
1976 *Where fire came down from: Social and economic life of the Niska*. Unpublished Ph.D. dissertation, Department of Anthropology, Bryn Mawr College.

MacDonald, George
1969 Preliminary culture sequence from the Coast Tsimshian area, British Columbia. *Northwest Anthropological Research Notes* 3:240–54.
1973 *Haida burial practices: three archaeological examples*. National Museum of Man, Mercury Series, Archaeological Survey of Canada Paper No. 9. Ottawa.
1983a Prehistoric art of the northern Northwest Coast. In *Indian Art Traditions of the Northwest Coast*, ed. by Roy Carlson. Simon Fraser University, Archaeology Press, Burnaby. Pp. 99–120.
1983b *Haida monumental art: Villages of the Queen Charlotte Islands*. University of British Columbia Press, Vancouver.
1989 *Chiefs of the sea and the sky*. University of British Columbia Press, Vancouver.

MacDonald, George, Gary Coupland, and David Archer
1988 The Coast Tsimshian ca. 1750. In *The Historical Atlas of Canada*, ed. by C. Harris, University of Toronto Press, Toronto. Pp. 32–33.

MacDonald, George, and Richard Inglis
1981 An overview of the North Coast Prehistory Project. In *BC Studies No. 48, Fragments of the Past: British Columbia Archaeology in the 1970s*, ed. by K. Fladmark. Pp. 37–63.

Mackie, Al.
1982 A Descriptive analysis of artifacts recovered in 1981 from the St. Mungo Cannery Site (DgRr 2). Manuscript prepared for Anthropology 490, University of Victoria.

MacNeish, Richard S.
1960 The Callison site in the light of archaeological survey of southwest Yukon. *National Museum of Canada, Bulletin No. 162*:1–51, Ottawa.

1964 Investigations in Southwest Yukon: Archaeological excavations, comparisons, and speculations. *Papers of the Robert S. Peabody Foundation for Archaeology 6*:201–488, Andover, Mass.

Mandryk, Carole Stein

1992 *Paleoecology as contextual archaeology: Human viability of the late quaternary ice-free corridor, Alberta, Canada.* Unpublished Ph. D. dissertation, University of Alberta, Edmonton.

Martin, John

1973 On the estimation of the sizes of local groups in a hunting-gathering environment. *American Anthropologist 75*:1448–1468.

Mason, Andrew

1994 *The Hatzic Rock site: A Charles culture settlement.* Unpublished Master's thesis, Department of Anthropology and Sociology, University of British Columbia, Vancouver.

Mason, Otis T.

1896 Influence of environment upon human industries or arts. In *Annual Report of the Smithsonian Institution for the Year 1895*, Washington. Pp. 639–665.

1907 Environment. In *Handbook of American Indians North of Mexico*, Vol. 1, ed. by Frederick W. Hodge, *Bureau of American Ethnology Bulletin 30*. Washington. Pp. 427–430.

Mathews, William H.

1979 Late Quaternary environmental history affecting human habitation of the Pacific Northwest. *Canadian Journal Archaeology 3*:45–56.

1980 Retreat of the last ice sheets in northeastern British Columbia and adjacent Alberta. *Geological Survey of Canada Paper 76–20*, Energy, Mines and Resources, Canada.

Mathews, William H., J. F. Fyles and H. W. Nasmith

1970 Postglacial Crustal Movement in Southwestern British Columbia and Adjacent Washington State. *Canadian Journal of Earth Sciences* 7: 690–702.

Matson, R. G.

1974 Clustering and scaling of Gulf of Georgia sites. *Syesis* 7:101–114.

1976 *The Glenrose Cannery site.* National Museum of Man, Mercury Series, Archaeological Survey of Canada, No. 52, Ottawa.

1981 Prehistoric subsistence patterns in the Fraser delta: The evidence from the Glenrose Cannery site. In *B. C. Studies No. 48, Fragments of the Past: British Columbia Archaeology in the 1970s*, ed. by K. Fladmark. Pp. 64–85.

1983 Intensification and the development of cultural complexity: the northwest versus the northeast coast. In *The evolution of maritime cultures on the Northeast and Northwest Coasts of America*, ed. by R. Nash. Simon Fraser University, Department of Archaeology, Publication No. 11, Burnaby. Pp. 125–48.

1985 The relationship between sedentism and status inequalities among hunter-gatherers. In *Status, Structure and Stratification: Current Archaeological Reconstructions*, ed. by M. Thompson, M. T. Garcia, and F. J. Kense. Archaeological Association of the University of Calgary, Calgary. Pp. 245–52.

1987 Review of Murray, Rebecca (1982). *Canadian Journal of Archaeology 11*: 197–200.

1988a The Old Cordilleran component at the Glenrose Cannery site and the origins of the Northwest Coast Pattern. Paper presented at the Annual Meetings of the Canadian Archaeological Association, Whistler, B. C.

1988b The origins of the Plateau Pithouse Tradition—or the Selah Springs Pattern 20 years later. Paper presented at the Annual Meetings of the Canadian Archaeological Association, Whistler, B. C.

1989 The Locarno Beach phase and the origins of the Northwest Coast Pattern. In *Development of hunting-fishing-gathering maritime societies along the west coast of North America* (Reprint Proceedings, Vol. IIIC), ed. by B. Onat. The Circum-Pacific Prehistory

Conference, Seattle, Washington, August 1–6, 1989. Washington State University Press, Pullman.

1992 The evolution of the Northwest Coast subsistence. In *Research in economic anthropology Sup. 6, long-term subsistence change in prehistoric North America*, ed. by D. Croes, R. Hawkins, and B. L. Isaac. JAI Press Inc., Greenwich, CT. Pp. 367–428.

Matson, R. G., Deanna Ludowicz, and William Boyd

1980 *Excavations at Beach Grove in 1980.* Report on file, Heritage Conservation Branch, Victoria, B. C.

Matson, R. G., Heather Pratt, and Lisa Rankin

1991 *1989 and 1990 Crescent Beach excavations, final report: The origins of the Northwest Coast ethnographic pattern: The place of the Locarno Beach phase.* Report on file at the Archaeology Branch, Victoria, and the Laboratoy of Archaeology University of British Columbia, Vancouver.

Matson, R. G., and D. L. True

1974 Site relationships at Quebrada Tarapaca, Chile: A comparison of clustering and scaling techniques. *American Antiquity 39*:51–73.

Mauger, Jeffrey E.

1978 *Shed roof houses at the Ozette archaeological site: A protohistoric architectural system.* Washington Archaeological Reseach Center Project Report No. 73, Washington State University, Pullman.

May, J.

1979 Archaeological Investigations at GbTn 19, Ridley Island, a Shell Midden in the Prince Rupert Area. Manuscript No. 1530, Archaeological Survey of Canada Archives, Ottawa.

Meany, Edmond S. (Editor)

1915 A new Vancouver journal on the discovery of Puget Sound by a member of the Chatham's crew. (Reprinted in *Vancouver's Discovery of Puget Sound* by Edmond S. Meany (1957), Binford's and Mort, Portland, Oregon.)

Mehringer, Peter H., and Franklin Foit

1990 Volcanic ash dating of the Clovis Cache at East Wenatchee, Washington. *National Geographic Research 6(4)*:495–503.

Meighan, Clement W., D. M. Pendegast, B. K. Swartz, and M. D. Wissler

1958 Ecological interpretation in archaeology: Part I. *American Antiquity 24*:1–23.

1959 Ecological interpretation in archaeology: Part II. *American Antiquity 24*:131–150.

Meltzer, David J.

1989 Why don't we know when the first people came to North America? *American Antiquity 54*:471–490.

Miller, Jay, and Seaburg, William R.

1990 Athapaskans of Southwestern Oregon. In *Handbook of North American Indians, Vol. 7: Northwest Coast*, ed. by Wayne Suttles, (W. C. Sturtevant gen. ed.). Smithsonian Institution Press, Washington. Pp. 580–588.

Minor, Rick

1984 An early complex at the mouth of the Columbia River. *Northwest Anthropological Research Notes 18(1)*:1–22.

1985 Paleo-Indians in western Oregon: A description of two fluted projectile points. *Northwest Anthropological Research Notes 19(1)*:33–40.

Minor, Rick, Kathryn Anne Toepel, and Ruth Greenspan

1987 Archaeological investigations at Yaquina Head, central Oregon coast. *Cultural Resource Series No. 1.* U.S. Dept. of the Interior, Bureau of Land Management, Oregon State Office, Portland.

Minor, Rick, and Kathryn Anne Toepel
1986 The Archaeology of the Tahkenitch Landing Site: Early Prehistoric Occupation on the Oregon Coast. Heritage Research Associates Report 46.

Mitchell, Donald H.
1968a Microblades: A long-standing Gulf of Georgia tradition. *American Antiquity 33*:11–15.
1968b *Archaeology of the Gulf of Georgia area, a natural region and its culture types.* Unpublished Ph.D. dissertation, Department of Anthropology, University of Oregon, Eugene.
1968c Excavations at two trench embankments in the Gulf of Georgia region. *Syesis 1*:29–46.
1969 Site survey in the Johnstone Strait region. *Northwest Anthropological Research Notes 3(2)*: 193–216.
1971a The Dionisio Point site and Gulf Island culture history. *Syesis 4*:145–168.
1971b Archaeology of the Gulf of Georgia, a natural region and its cultural types. *Syesis 4* (Suppl. 1), Victoria.
1974 Salvage excavations at site DfSf 13, Buckley Bay, British Columbia. In *Archaeological salvage projects 1973*, W. J. Bryne (compiler), National Museum of Man, Mercury Series, Archaeological Survey of Canada Paper No. 26, Ottawa. Pp. 88–92.
1979 Bowker Creek: A microblade site on southeastern Vancouver Island. *Syesis* 12:77–100.
1980 DcRt 1: A salvage excavation from southern Vancouver Island. *Syesis 13*:37–51.
1981a DcRu 78: A prehistoric occupation of Fort Rodd Hill National Park. *Syesis 14*:131–150.
1981b Sebassa's men. In *The world is as sharp as a knife*, ed. by D. Abbott. British Columbia Provincial Museum, Victoria, B. C. Pp. 79–86.
1983a Seasonal settlements, village aggregations, and political autonomy on the central Northwest Coast. In *The development of political organization in native North America*, ed. by Elizabeth Tooker. Proceedings of the American Ethnological Society, Washington. Pp. 97–107.
1983b Tribes and chiefdoms of the Northwest Coast: The Tsimshian case. In *The evolution of maritime cultures on the Northeast and Northwest Coasts of America*, ed. by R. Nash. Simon Fraser University, Department of Archaeology, Publication No. 11, Burnaby. Pp. 57–64.
1984 Predatory warfare, social status, and the north Pacific slave trade. *Ethnology 23(1)*: 39–48.
1985 A demographic profile of Northwest Coast slavery. In *Status, structure and stratification: Current archaeological reconstructions*, ed. by M. Thompson, M. T. Garcia, and F. J. Kense. Archaeological Association of the University of Calgary, Calgary. Pp. 227–236.
1988a Changing patterns of resource use in the prehistory of Queen Charlotte Strait, British Columbia. In *Research in Economic Anthropology, Supplement 3: Prehistoric economies of the Pacific Northwest Coast*, ed. by Barry Isaac. JAI Press, Inc. Greenwich, CT. Pp. 245–290.
1988b The J. Puddleduck site: A northern Strait of Georgia Locarno Beach component and its predecessor. *Contribution to Human History No. 2.* Royal British Columbia Museum, Victoria, B. C.
1990 Prehistory of the coasts of southern British Columbia and northern Washington. In *Handbook of North American Indians, Vol. 7: The Northwest Coast*, ed. by Wayne Suttles (W. C. Sturtevant gen. ed.). Smithsonian Institution Press, Washington. Pp. 340–358.

Mitchell, Donald H., and Leland Donald
1985 Some economic aspects of Tlingit, Haida and Tsimshian slavery. *Research in Economic Anthropology* 7:19–35. Greenwich, CT.
1988 Archaeology and the study of Northwest Coast economies. In *Research in Economic Anthropology, Supplement 3: Prehistoric economies of the Northwest Coast*, ed. by Barry Isaac. JAI Press, Inc., Greenwich, CT. Pp. 293–351.

Mitchell, D. H., and D. L. Pokotylo
1988 Early period components at the Milliken Site, Fraser Canyon, British Columbia. Paper delivered at the Canadian Archaeological Association Annual Meetings, Whistler, B. C.

Mobley, Charles M.
1991 *The campus site: A prehistoric camp at Fairbanks, Alaska.* University of Alaska Press, Fairbanks.

Mochanov, Yu, A.
1980 Early migrations to America in light of a study of the Dyuktai paleolithic culture in Northeast Asia. In *Early Native Americans*, ed. by D. L. Brownman. Mouton, The Hague. Pp. 119–131.

Monks, Gregory
1976 Quantitative comparison of Glenrose components with the Marpole component from Site DhRt 3. In *The Glenrose Cannery Site.* Ed. by R. G. Matson. National Museums of Man, Mercury Series, Archaeological Survey of Canada Paper No. 52, Ottawa. Pp. 267–280.
1977 *An examination of relationships between artifact classes and food resources at Deep Bay, DiSe 7.* Unpublished Ph.D. dissertation, Department of Anthropology and Sociology, University of British Columbia, Vancouver.
1980 Saltery Bay: A mainland archaeological site in the northern Strait of Georgia. *Syesis 13*:109–136.
1987 Prey as bait: The Deep Bay example. *Canadian Journal of Archaeology 11*:119–42.

Mooney, James
1928 The aboriginal population of America North of Mexico. *Smithsonian Miscellaneous Collections 80(7)*, Washington.

Moss, Madonna L.
1989a Analysis of the vertebrate assemblage. In *The Hidden Falls Site, Baranof Island, Alaska*, ed. by Stanley Davis. Alaska Anthropological Association Monograph Series, Brockport. Pp. 93–120.
1989b *Archaeology and cultural ecology of the prehistoric Angoon Tlingit.* Unpublished Ph.D. dissertation, University of California, Santa Barbara.

Moss, Madonna L., and Jon Erlandson
1992 Forts, refuge rocks, and defensive sites: The antiquity of warfare along the north Pacific Coast of North America. *Arctic Anthropology 29(2)*:73–90.

Moss, Madonna L., J. Erlandson, and R. Stuckenrath
1989 The antiquity of Tlingit settlement on Admiralty Island. *American Antiquity 54*: 534–542.
1990 Wood stake weirs and salmon fishing on the Northwest Coast: Evidence from southeast Alaska. *Canadian Journal of Archaeology 14*:143–158.

Muller-Beck, Hansjurgen
1982 Late Pleistocene man in northern Alaska and the Mammoth-stepped biome. In *Paleoecology of Beringia*, ed. by D. M. Hopkins, J. V. Matthews, Jr., C. E. Schweger, and S. B. Young. Academic Press, New York. Pp. 329–352.

Murdock, George Peter
1934 The Haidas of British Columbia. In *Our Primitive Contemporaries*, ed. by G. P. Murdock. MacMillan, New York. Pp. 221–263.

Murray, J. S.
1981 Prehistoric skeletons from Blue Jackets Creek (FlUa 4), Queen Charlotte Islands, British Columbia. In *Contributions to physical anthropology 1978–1980*, ed. by J. Cybulski. National Museum of Man, Mercury Series, Archaeological Survey of Canada Paper No. 106, Ottawa. Pp. 127–168.

Murray, Rebecca
1982 *Analysis of artifacts from four Duke Point area sites near Nanaimo, B. C.: An example of cultural continuity in the southern Gulf of Georgia region.* National Museum of Man, Mercury Series, Archaeological Survey of Canada Paper No. 113, Ottawa.

Nelson, N. C.
1937 Notes on cultural relations between Asia and America. *American Antiquity* 2:267–272.

Nelson, Charles N.
1969 *The Sunset Creek site (45-KT-28) and its place in plateau prehistory.* Washington State University, Laboratory of Anthropology, Reports of Investigations No. 47, Pullman.
1990 Prehistory of the Puget Sound region. In *The handbook of the North American Indians, Vol. 7: The Northwest Coast*, ed. by W. Suttles (W. C. Sturtevant, gen. ed.). Smithsonian Institution, Washington. Pp. 481–484.

Nelson, D. E., R. Morlan, J. Vogel, J. Southon, and C. R. Harington
1986 New dates on northern Yukon artifacts: Holocene not Upper Pleistocene. *Science 232*: 749–751.

Newman, Thomas M.
1959 *Tillamook prehistory and its relation to the northwest culture area.* Published Ph.D. dissertation, Department of Anthropology, University of Oregon, Eugene.

Newman, Thomas S.
1959 Toleak Point: An archaeological site on the north central Washington coast. *Washington State University, Laboratory of Anthropology. Reports of Investigations 4.* Pullman.

Nolan, Richard
1977 *The utilization of fish resources by the Coast Tsimshian: Predicting optimal patterns of exploitation.* Unpublished Master's thesis, Department of Anthropology, Trent University, Peterborough, Ontario.

Nordquist, Delmar
1976 45SN100—The Biederbost site, Kidd's Duval site. In *The excavation of water-saturated sites (wet sites) on the Northwest Coast of North America*, ed. by D. Croes. National Museum of Man, Mercury Series, Archaeological Survey of Canada Paper No. 50, Ottawa. Pp. 186–200.

Oberg, K.
1973 *The social economy of the Tlingit Indians.* University of Washington Press, Seattle.

Olson, R.
1967 Social structure and social life of the Tlingit in Alaska. *University of California Anthropological Records 26*, Berkeley.

Osborne, Douglas
1956 Evidence of the early lithic in the Pacific Northwest. *Research Studies of the State College of Washington 24*:38–44.

Osborne, Douglas, Warren Caldwell, and Robert Crabtree
1956 The problem of Northwest Coastal-Interior relationships as seen from Seattle. *American Antiquity* 22:117–129.

Patenaude, Valerie (Editor)
1985 Pitt River archaeological site: A Coast Salish seasonal camp on the lower Fraser River. Report on file, Heritage Conservation Branch, Victoria, B. C.

Peacock, William
1976 Cluster analysis and multi-dimensional scaling of cultural components at Glenrose. In *The Glenrose Cannery Site*, ed. by R. G. Matson. National Museums of Man, Mercury Series, Archaeological Survey of Canada Paper No. 52, Ottawa. Pp. 214–230.
1982 The Telep Site: A late autumn fish camp of the Locarno Beach Culture Type. Report on file, Heritage Conservation Branch, Victoria, B. C.

Percy, Richard
1974 *The Prehistoric cultural sequence at Crescent Beach, British Columbia.* Unpublished Master's thesis, Department of Archaeology, Simon Fraser University, Burnaby.

Pettigrew, Richard M.
1990 Prehistory of the lower Columbia and Willamette Valley. In *Handbook of North American Indians, Vol. 7: Northwest Coast,* ed. by W. Suttles (W. C. Sturtevant, gen. ed.). Smithsonian Institution, Washington. Pp. 518–529.

Phebus, George E. Jr., and Robert M. Drucker
1979 *Archaeological investigations at Seaside, Oregon.* Seaside Museum and Historical Society. Seaside, Oregon.

Piddocke, Stuart
1965 The potlatch system of the southern Kwakiutl: A new perspective. *Southwestern Journal of Anthropology 21*:244–264.

Pomeroy, John A.
1976 Stone fish traps of the Bella Bella region. In *Current research reports,* ed. by R. Carlson. Simon Fraser University, Department of Archaeology, Publication No. 3, Burnaby. Pp. 165–173.
1980 *Bella Bella settlement and subsistence.* Unpublished Ph.D. dissertation, Department of Archaeology, Simon Fraser University, Burnaby.

Powers, W. Roger, and John F. Hoffecker
1989 Late Pleistocene settlement in the Nenana Valley, Central Alaska. *American Antiquity 54*: 263–287.

Pratt, Heather
1988 An Examination of Old Cordilleran Chipped Stone Tools at Milliken and Glenrose. Paper prepared for D. L. Pokotylo, Laboratory of Archaeology, University of British Columbia, Vancouver.
1992 *The Charles culture of the Gulf of Georgia: A reevaluation of the Charles Culture and its three sub-phases.* Unpublished Master's thesis, Department of Anthropology and Sociology, University of British Columbia, Vancouver.

Price, T. Douglas, and James A. Brown (Editors)
1985 *Prehistoric hunter-gatherers: The emergence of cultural complexity.* Academic Press, San Diego.

Rabich-Campbell, Chris
1984 Preliminary report describing results of a test excavation at CRG–164, Sarkar entrance, Prince of Wales Island, Southeast Alaska. Paper presented at the 11th Annual Alaskan Anthropological Meetings, Fairbanks.

Rankin, Lisa
1991 Shellfish. In *1989 and 1990 Crescent Beach Excavations, Final Report; The Origins of the Northwest Coast Ethnographic Pattern: The Place of the Locarno Beach Phase,* ed. by R. G. Matson, Heather Pratt & Lisa Rankin. Report on file at the Archaeology Branch, Victoria, and the Laboratory of Archaeology, University of British Columbia, Vancouver. Pp. 79–113.

Renker, Ann M., and Erna Gunther
1990 Makah. In *The handbook of the North American Indians, Vol. 7, the Northwest Coast,* ed. by W. Suttles (W. C. Sturtevant, gen. ed.). Smithsonian Institution, Washington. Pp. 422–430.

Rice, David G.
1972 *The Windust phase in Lower Snake River region prehistory.* Washington State University, Laboratory of Anthropology, Reports of Investigations No. 50, Pullman.

Richardson, Allan S.
1982 The control of productive resources on the Northwest Coast of North America. In *Resource managers: North American and Australian hunter-gatherers*, ed. by Nancy Williams and Eugene Hunn. (AAAS Selected Symposia 67) Westview Press, Boulder, Colorado. Pp. 93–112.

Riches, David
1979 Ecological variation on the Northwest Coast: Models for the generation of cognatic and matrilineal descent. In *Social and Ecological Systems*, ed. by. P. C. Burnham and R. F. Ellen. A. S. A. Monograph 18, Academic Press, London. Pp. 145–166.

Ricketts, Edwards F., Jack Calvina, and Joel W. Hedgpeth
1985 *Between Pacific tides*, Fifth Edition. Stanford University Press, Palo Alto, CA.

Roberts, L.
1984 Faunal analysis of the Paul Mason site. Manuscript on file, Laboratory of Archaeology, University of British Columbia, Vancouver.

Roberts, L. D.
1982 Southeastern archeology in the light of the Irish Creek site. Paper presented at the 9th Annual Alaska Anthropological Conference, Fairbanks.

Robinson, Ellen
1976 Harlan I. Smith, Boas, and the Salish: Unweaving archaeological hypotheses. *Northwestern Anthropological Research Note 10*:185–196.

Rogers, Malcom J.
1939 Early lithic industries of the lower basin of the lower Colorado River and adjacent desert areas. *San Diego Museum Papers* No. 3, San Diego.

Roll, Tom E.
1974 *The archaeology of Minard: A case study of a late prehistoric Northwest Coast procurement system.* Unpublished Ph.D. dissertation, Department of Anthropology, Washington State University, Pullman.

Romanoff, Steven
1985 Fraser Lillooet Salmon Fishing. *Northwest Anthropological Research Notes, 19*:119–160.

Ross, Richard E.
1984 Terrestrial oriented sites in a marine environment along the southern Oregon coast. *Northwest Anthropological Research Notes 18*:241–255.
1990 Prehistory of the Oregon coast. In *Handbook of North American Indians, Vol. 7: Northwest Coast*, ed. by W. Suttles (W. C. Sturtevant, gen. ed.). Smithsonian Institution, Washington. Pp. 554–59.

Rosman, Abraham, and Paula Rubel
1986 The evolution of central Northwest Coast societies. *Journal of Anthropological Research 42*:557–572.

Rubel, Paula, and Abraham Rosman
1983 The evolution of exchange systems and ranking: Some Northwest Coast and Athapaskan examples. *Journal of Anthropological Research 39*:1–25.

Ruyle, Eugene E.
1973 Slavery, surplus, and stratification on the Northwest Coast: The ethnoenergetics of an incipient stratification system. *Current Anthropology 14(5)*:603–631.

Sahlins, Marshal D., and Elman R. Service (Editors)
1960 *Evolution and culture.* University of Michigan Press, Ann Arbor.

Samuels, Stephan R.

1983 *Spatial patterns and cultural processes in three Northwest Coast Longhouse Floor middens from Ozette.* Unpublished Ph.D. dissertation, Department of Anthropology, Washington State University, Pullman.

1989 Spatial patterns in Ozette Longhouse floor middens. In *Households and Communities,* ed. by S. MacEachern, D. Archer, and R. Garvin. University of Calgary Archaeological Association, Calgary. Pp. 143–156.

Samuels, Stephan R. (Editor)

1991 *Ozette Archaeological Project research reports, Volume I: House structure and floor midden.* Washington State University Reports of Investigations No. 63, Pullman.

1994 *Ozette Archaeological Project research reports Volume II: Fauna.* Washington State University Reports of Investigations No. 66, Pullman.

Sanger, David

1970 The archaeology of the Lochnore-Nesikep Locality, British Columbia. *Syesis 3,* Supplement 1, Victoria.

Sapir, Edward

1915 The Na-Dene languages, a preliminary report. *American Anthropologist 17(4):*534–558.

Saxe, Arthur

1970 *Social dimensions of mortuary practices.* Unpublished Ph.D. dissertation, Department of Anthropology, University of Michigan, Ann Arbor.

1971 Social dimensions of mortuary practices in a Mesolithic population from Wadi Halfa, Sudan. In *Approaches to the social dimensions of mortuary practices,* ed. by James Brown. Memoirs of the Society for American Archaeology Vol. 25. Pp. 39–57.

Schalk, Randall F.

1977 The structure of an anadromous fish resource. In *For theory building in archaeology,* ed. by L. Binford. Academic Press, New York. Pp. 207–249.

1981 Land use and organizational complexity among foragers of northwestern North America. In *Affluent Foragers,* ed. by S. Koyama and D. H. Thomas, Senri Ethnological Studies No. 9, National Museum of Ethnology, Osaka. Pp. 53–75.

Schreindorfer, Crystal S.

1988 *Archaeological investigations at the Marial Site (35CU84), Curry County, Oregon.* Unpublished Master's thesis, Oregon State University, Corvalis.

Schumacher, Paul

1874 Remarks on the Kjokkenmoddings of the Northwest Coast. *Annual Report of the Smithsonian Institution for 1873,* 354–362, Washington.

1877a Aboriginal settlements of the Pacific coast. *Popular Science Monthly 10:*353–356.

1877b Researches in the kjokkenmoddings and graves of a former population of the coast of Oregon. *Bulletin of the U. S. Geological and Geographical Survey of the Territories 3:* 27–37.

Scudder, Geoffrey G. E., and Nicholas Gessler (Editors)

1989 *The outer shores.* Queen Charlotte Islands Museum Press, Skidegate.

Seaburg, William R., and Jay Miller

1990 Tillamook. In *Handbook of North American Indians, Vol. 7: Northwest Coast,* ed. by W. Suttles (W. C. Sturtevant, gen. ed.). Smithsonian Institution, Washington. Pp. 560–567.

Service, Elman R.

1962 *Primitive social organization: An evolutionary perspective.* Random House, New York.

1971 *Primitive social organization: An evolutionary perspective* (Second Edition). Random House, New York.

1975 *Origins of the state and civilization: The process of cultural evolution.* Norton & Co., New York.

Severs, Patricia

1974a Archaeological investigations at Blue Jackets Creek, FlUa 4, Queen Charlotte Islands, British Columbia. *Canadian Archaeological Association Bulletin* 6:163–205.

1974b Salvage archaeology at the Council site, GaUb 7, Queen Charlotte Islands. Report on file, Archaeological Sites Advisory Board of British Columbia, Victoria, B. C.

1975 Recent research into the prehistory of the Queen Charlotte Islands. *The Midden* 7:15–17.

Seymour, Brian

1976 1972 salvage excavations at DfRs 3, the Whalen Farm Site. In *Current research reports,* ed. by R. Carlson. Simon Fraser University, Department of Archaeology Publication No. 3, Burnaby. Pp. 83–98.

Shaw, Robert D.

1977 *Report of excavations: The Martin Site (45PC7), 1974.* Occasional Paper No. 5, Washington Archaeological Society, Seattle.

Sheppard, J. C., P. E. Wigand, C. E. Gustafson, and M. Rubin

1987 A Reevaluation of the Marmes Rockshelter radiocarbon chronology. *American Antiquity* 52:118–125.

Shutler, Richard, Jr. (Editor)

1983 *Early man in the New World.* Sage Publications, Inc. Beverly Hills.

Simonsen, Bjorn

1973 *Archaeological investigations in the Hecate Strait–Milbanke Sound area.* National Museum of Man, Mercury Series, Archaeological Survey of Canada, No. 13, Ottawa.

Smith, Derek G.

1964 *Archaeological excavations at the Beach Grove site, DgRs 1, during the summer of 1962.* B. A. Honours thesis. Department of Anthropology and Sociology, University of British Columbia, Vancouver.

Smith, Harlan I.

1903 Shell-heaps of the lower Fraser River, British Columbia. Publications of the Jesup North Pacific Expedition 2(4); *Memoirs of the American Museum of Natural History 4(4):* 133–91.

1907 Archaeology of the Gulf of Georgia and Puget Sound. Publications of the Jesup North Pacific Expedition 2(6); *Memoirs of the American Museum of Natural History 4(6):* 303–441, New York.

1909 Archaeological remains on the coast of northern British Columbia and southern Alaska. *American Anthropologist 11:*595–600.

1921 Unpublished notes in National Archives of Canada, Ottawa. (Originally B. C. File 55, Box 10).

1929 Kitchen-middens of the Pacific coast of Canada. *National Museum of Canada, Annual Report for 1927, Bulletin 56:*42–46, Ottawa.

1930 A list of archaeological sites near Prince Rupert, British Columbia. Report on file, National Museum of Man, Archaeological Survey of Canada, Archives, Ottawa.

Smith, Harlan I., and G. Fowke

1901 Cairns of British Columbia and Washington. *Memoirs of the American Museum of Natural History* 4(2), New York.

Smith, Jason

1974 The Northeast Asian–Northwest American microblade tradition (NANAMT). *Journal of Field Archaeology 1:*347–364.

Smith, M. E.
1981 Review of *Western Indians* by Joseph Jorgensen. *American Indian Quarterly* 5:288.

Sneed, Paul G.
1970 The Archaeology of the Liquid Air Site: A Preliminary Report. Report on file, Laboratory of Archaeology, University of British Columbian, Vancouver.
1971 Of salmon and men: An investigation of ecological determinants and aboriginal man in the Canadian Plateau. In *Aboriginal man and environments on the plateau of Northwest America*, ed. by Arnoud Stryd and Rachel Smith. University of Calgary Archaeology Association, Calgary. Pp. 229–242.

Snyder, Warren A.
1956 Sampling at "Old Man House" on Puget Sound. *Research Studies of the State College of Washington 24*:17–37.

Steifel, Cheryl
1985 *The subsistence economy of the Locarno Beach culture (3300– 2400 B.P.).* Unpublished Master's thesis, Department of Anthropology and Sociology, University of British Columbia, Vancouver.

Stein, Julie K. (Editor)
1991 *Deciphering a shell midden.* Academic Press, San Diego.

Stevenson, Ann
1977 An analysis of seasonal shellfish collection at Namu. Manuscript on file, Department of Archaeology, Simon Fraser University, Burnaby.

Steward, Julian
1938 Basin-Plateau aboriginal sociopolitical groups. *Bulletin of the Bureau of American Ethology 120*:1–346.
1955 *The theory of culture change: The methodology of multilineal evolution.* University of Illinois Press, Urbana.

Stewart, Francis
1974 *Staff research: Archaeological survey of Canada annual review, 1973*, ed. by G. MacDonald. National Museum of Man, Mercury Series, Archaeological Survey of Canada Paper No. 21, Ottawa. Pp. 24–29.
1977 Vertebrate Faunal Remains from the Boardwalk Site (GbTo 31) of Northern British Columbia. Manuscript No. 1263, Archaeological Survey of Canada Archives, Ottawa.

Strong, William D., W. E. Schenck, and Julian H. Steward
1930 Archaeology of the Dalles-Deschutes region. *University of California Publications in American Archaeology and Ethnology* 29:1–154.

Styles, Nora
1976 Preliminary report on the Glenrose burials. In *The Glenrose Cannery site*, ed. by R. G. Matson. National Museums of Man, Mercury Series, Archaeological Survey of Canada Paper No. 52, Ottawa. Pp. 203–213.

Sutherland, Eileen
n.d. (1974) Report on excavation at DgRs 11, English Bluff, Tsawwassen, 1969, DgRs 9, Tsawwassen Beach, 1970. Report on file, Heritage Conservation Branch, Victoria, and Laboratory of Archaeology, University of British Columbia, Vancouver.

Sutherland, Patricia
1980 Understanding cultural relationships across Hecate Strait, northern British Columbia. Paper presented at the 13th annual Canadian Archaeological Association Conference, Saskatoon.

Suttles, Wayne

1951 *Economic life of the Coast Salish of Haro and Rosario straits.* Unpublished Ph.D. dissertation, Department of Anthropology, University of Washington, Seattle.

1960 Affinal ties, subsistence, and prestige among the Coast Salish. *American Anthropologist 62*:296–305.

1962 Variation in habitat and culture on the Northwest Coast. In *Proceedings of the 34th International Congress of Americanists, Vienna, 1960,* Vienna. Pp. 522–537.

1968 Coping with abundance: Subsistence on the Northwest Coast. In *Man the Hunter,* ed. by Richard B. Lee and Irven DeVore. Aldine, Chicago. Pp. 56–68.

1973 *CA** comment on Ruyle (1973). *Current Anthropology 15*:622–623.

1987 *Coast Salish essays.* University of Washington Press, Seattle.

1990a Introduction. In *Handbook of North American Indians, Vol. 7: Northwest Coast,* ed. by W. Suttles (W. C. Sturtevant, gen. ed.). Smithsonian Institution, Washington. Pp. 1–15.

1990b Environment. In *Handbook of North American Indians, Vol. 7: Northwest Coast,* ed. by W. Suttles (W. C. Sturtevant, gen. ed.). Smithsonian Institution, Washington. Pp. 16–29.

1991 The Shed-Roof House. In *A Time of Gathering,* ed. by Robin K. Wright. University of Washington Press, Seattle. Pp. 212–222.

Suttles, Wayne, and Aldona Jonaitis

1990 History of Research in Ethnology. In *Handbook of North American Indians, Vol. 7: Northwest Coast,* ed. by W. Suttles, (W. C. Sturtevant, gen. ed.). Smithsonian Institution, Washington. Pp. 73–87.

Tainter, Joseph

1978 Mortuary practices and the study of prehistoric social systems. In *Advances in Archaeological Method and Theory,* Vol. 1, ed. by M. B. Schiffer. Academic Press, New York. Pp. 105–141.

Tankersley, Kenneth B., and Cheryl Ann Munson

1992 Comments on the Meadowcroft Rockshelter radiocarbon chronology and the recognition of coal contaminants. *American Antiquity 57*:321–326.

Teit, James A.

1900 The Thompson Indians of British Columbia. In *Memoirs of the American Museum of Natural History,* ed. by Franz Boas. *2(4)*:163–393.

Testart, A.

1982 The significance of food-storage among hunter-gatherers: Residence patterns, population densities and social inequalities. *Current Anthropology 23*:523–537.

Thom, Brian

1992a *Archaeological investigations at the Whalen Farm site (DfRs 3), 1949–50: Re-contextualizing Borden's Whalen Farm.* B. A. Honours thesis, Department of Anthropology and Sociology, University of British Columbia, Vancouver.

1992b An investigation of interassemblage variability within the Gulf of Georgia phase. *Canadian Journal of Anthropology 16*:24–31.

Thom, Brian, and R. G. Matson

1991 Whalen Farm Artifacts. In *1989 and 1990 Crescent Beach Excavations, Final Report; The Origins of the Northwest Coast Ethnographic Pattern: The Place of the Locarno Beach Phase,* R. G. Matson, Heather Pratt, and Lisa Rankin. Report on file at the Archaeology Branch, Victoria, and the Laboratory of Archaeology, University of British Columbia, Vancouver. Pp. 147–149.

Thompson, Gail

1978 *Prehistoric settlement changes in the southern Northwest Coast: A functional approach.* University of Washington, Reports in Archaeology 5, Seattle.

Thompson, Laurence C., and M. Dale Kinkade
1990 Languages. In *The Handbook of North American Indians Vol. 7: Northwest Coast*, ed. by W. Suttles (W. C. Sturtevant, gen. ed.). Smithsonian Institution, Washington. Pp. 30–51.

Torgerson, W. S.
1958 *Theory and method of scaling.* Wiley and Sons, New York.

Trace, Andrew
1981 *An examination of the Locarno Beach Phase as represented at the Crescent Beach site, DgRr 1, British Columbia.* Unpublished Master's Thesis, Department of Archaeology, Simon Fraser University, Burnaby.

Turner, Christy G. II
1985 The dental search for Native American origins. In *Out of Asia; Peopling the Americas and the Pacific*, ed. by R. Kirk and E. Szathmary. The Journal of Pacific History, Canberra. Pp. 31–78.

Vayda, Andrew P.
1961 A Re-examination of Northwest Coast Economic Systems. *Transactions of the New York Academy of Sciences*, ser. 2, Vol. 23(7):618–624.

Warren, Claude N.
1967 The San Dieguito complex: A review and hypothesis. *American Antiquity 32*:168–185.
1968 *The view from Wenas: A study in plateau prehistory.* Occasional Papers of the Idaho State University Museum, No. 24, Pocatello.

Warren, Claude N., D. L. True, and Ardith A. Eudey
1961 Early gathering complexes of western San Diego County. In *Archaeological survey annual report, 1960–1961*, University of California, Los Angeles. Pp. 1–106.

Washbrook, Kevin
1992 A Study of the Correlation between Individual Mobility, Flexibility of Residence and affiliation and Predictability of Salmon Resources on the Northwest Coast. Paper prepared for Anthropology 460, Cultural Evolution and Cultural Ecology, University of British Columbia, Vancouver.

Weide, Margaret L.
1969 Seasonality of Pismo Clam Collecting at Ora–82. In *Archaeological survey annual report 1969*, ed. by T. F. King, J. P. Carpenter, and N. N. Leonard. Department of Anthropology, University of California, Los Angeles. Pp. 127–141.

Wessen, Gary C.
1982 *Shell middens as cultural deposits: A case study from Ozette.* Unpublished Ph.D. dissertation, Department of Anthropology, Washington State University, Pullman.
1988 The use of shellfish resources on the Northwest Coast: The view from Ozette. In *Research in Economic Anthropology Supplement 3: Prehistoric Economies of the Pacific Northwest Coast*, ed. by B. L. Isaac, JAI Press, Greenwich, CT. Pp. 179–207.
1990 Prehistory of the Coast of Washington. In *Handbook of North American Indians, Vol. 7: Northwest Coast*, ed. by W. Suttles (W. C. Sturtevant, gen. ed.). Smithsonian Institution, Washington. Pp. 412–421.

West, F. H.
1981 *The Archaeology of Beringia.* Columbia University Press, New York.

White, James M., Rolf W. Mathewes, and William H. Mathews
1985 Late Pleistocene chronology and environment of the "ice-free corridor" of Northwestern Alberta. *Quaternary Research 24(2)*:173–186.

Wickersham, James
1896a Some Northwest Coast burial customs. *American Antiquarian and Oriental Journal, 18*: 204–06.

1896b Pueblos of the Northwest Coast. *American Antiquarian and Oriental Journal 18*:21–24.
1900 Some relics of the Stone Age from Puget Sound. *American Antiquarian and Oriental Journal* 22:141–49.

Wigen, Rebecca
1980 *A faunal analysis of two middens on the east coast of Vancouver Island.* Unpublished Master's thesis, Department of Anthropology, University of Victoria, Victoria, B. C.

Wigen, Rebecca, and Barbara Stucki
1988 Taphonomy and stratigraphy in the interpretation of Economic Patterns at Hoko River Rockshelter. In *Research in Economic Anthropology Supplement 3: Prehistoric Economies of the Pacific Northwest Coast*, ed. by B. L. Isaac, JAI Press, Greenwich, CT. Pp. 87–146.

Williams, Harry F. L.
1988 *Sea-level change and delta growth, Fraser delta, British Columbia.* Unpublished Ph.D. dissertation, Department of Geography, Simon Fraser University, Burnaby.

Williams, R. C., A. G. Steinberg, H. Gershowitz, P. H. Bennett, W. G. Knowler, D. J. Pettitt, W. Butler, R. Baird, L. Dowda-Rea, T. A. Burgh, H. G. Morse, and C. G. Smith
1985 G M Allotypes in Native Americans: Evidence for three distinct migrations across the Bering Land Bridge. *American Journal of Physical Anthropology 66*:1–19.

Willig, Judith, C. M. Aikens, and John Fagan (Editors)
1988 Early human occupation in far western North America. The Clovis–Archaic interface, *Nevada State Museum Anthropological Papers No. 21*, Carson City, Nevada.

Wilmeth, Roscoe
1978 *Canadian archaeological radiocarbon dates (revised edition)* National Museum of Man Mercury Series, Archaeological Survey of Canada Paper No. 77, Ottawa.

Wissler, F. Clark
1914 Material cultures of the North American Indians. *American Anthropologist 16*: 447–505.
1917 [1938] *The relation of nature to man in aboriginal America.* McMurtrie, New York.

Wolf, Eric R.
1982 *Europe and the people without history.* University of California Press, Berkeley.

Wood, John J., and R. G. Matson.
1973 Two models of sociocultural systems and their implications for the archaeological study of change. In *The Explanation of Culture Change*, ed. by C. Renfrew. Duckworth, London. Pp. 673–683.

Yi, S., and Geoffrey Clark
1985 The Dyuktai Culture and New World origins. *Current Anthropology 26*:1–20.

This page intentionally left blank

Index

Abbott, D., 201
Aberle, D., 36, 153, 248
Acheson, S., 240, 284, 285, 286, 287, 291, 297, 313
Ackerman, R., 88
  Chuck Lake, 86, 87
  Ground Hog Bay, 45, 62, 84, 85
  Rosie's rockshelter, 135, 136
Acmaea spp. 24, 137
Adams, J., 284
Adovasio, J., 58, 180
Aechmophorus spp., 271
Alexander, D., 60
Allaire, L., 44, 129, 131, 141, 185, 236, 237, 240
Ames, K.
  Hagwilget Canyon, 44, 131
  households, 32, 35, 235, 260–262, 280
  information processing model, 149, 244–245
  Meier site, 260–262
  North coast prehistory, 137–139, 141, 142, 183, 191, 193, 234
  prehistoric social organization, 46, 149, 244–245, 311
  Prince Rupert Harbour, 240, 279, 280
Anderberg, M., 212
Andrews, J. T., 195
Anutcix phase, 274–277
Anutcix site, 274
Apland, B., 157
Arcas, 157, 177, 178
Archer, D., 155, 178, 233, 279
Axeti site, 274, 275, 277

Baird, R., 50
Ball, B., 157

Balanus spp., *see* Barnacle
Barnacle, 23, 209, 137, 140, 170, 172
Baumhoff, M., 22, 30, 256
Bay mussel, *see Mytilus edulis*
Beach Grove subphase, 212
Beach Grove site, 208, 219, 223
Bear Cove site,
  Obsidian Culture component, 123
  Old Cordilleran component, 74–77, 300
Beattie, O., 149, 215, 243
Bennett, A., 121, 122, 256, 258
Bennett, P., 50
Bense, J., 68, 69, 78
Bent-nose clam, 119, 121
Bernick, K.
  Little Qualicum site, 269, 270, 283
  perishables, 45, 116, 178, 179, 219, 221, 297, 312
Berreman, J. V., 41
Berry, M., 57, 119, 136
Biederbost site, 221
Bigelow, N., 58, 82
Binford, L., 114, 141, 197, 210, 245
Bissell, C., 279, 280
Blacklock Bluff site, 118
Blackman, M., 25, 32, 286
Blaise, B., 64
Blake, M., 209
Blinman, E., 45, 178
Blue Jackets Creek burial sidebar, 138
Blue Jackets Creek site, 137, 192, 240, 303
Blundon site, 121, 255
Boardwalk site
  house features, 235, 280
  Period I, 278–281, 304
  Period II, 191, 192, 229, 234–235
  Period III, 126–129
Boas, F., 5, 12, 38, 40, 146, 279
Bobrowskey, P. T., 60
Boehm, S. G., 46, 98, 107, 108, 110, 166, 168, *see also* Calvert, Frederick
Borden, C.
  Charles culture, 98, 117
  Fraser canyon, 78, 84, 181
  historical position, 42–43, 44, 47, 307, 314
  Locarno Beach phase, 154, 155, 156, 157, 165, 178
  Marpole phase, 200, 201, 208, 209
  microblades, 65, 82, 83, 94, 95
  Migration model, 147, 154–157
  Pasika complex, 58
  Protowestern tradition, 66–67, 300
  Stselax phase, 267, 269
  Whalen Farm II, 218–219
Bornite phase, 90–92
Botkin, S., 194
Bowker Creek site, 165, 176
Boyd, R., 6, 14
Boyd, W., 161, 169, 175, 201, 203, 208, 211, 212, 223
Broad niche adaptation, 114
Brookfield, H. C., 245, 305, 310
Brown, J., 5
Bryan, A., 43, 269
Buckley Bay site, 166
Bullard Beach site, 256
Burgh, T. A., 50
Burley, D.
  burial patterns, 182, 210, 241, 242, 303
  canyon model, 148, 149, 243
  historical position, 46, 47
  Locarno Beach phase, 157, 161
  Marpole phase, 163, 201, 203, 208, 209, 211, 212, 213, 215, 221, 246
  Whalen Farm II, 218
Butler, B. R., 68, 78
Butler, V., 79, 167, 271
Butler, W., 50
Butter clam, *see Saxidomus giganteus*

Cabezon, 251, 258
Caldwell, W., 147
California mussel, *see Mytilus californianus*
Calvert, S. G.; *see also* Boehm, Frederick
  Hesquiat locality, 225, 226, 227, 272, 281, 287
  historical position, 44, 45, 46
  Lachane/Co-op site, 126, 127, 191, 192
  salmon storage, 167
  St. Mungo phase, 97, 98, 101
Calvin, J., 30
Campbell, S., 271
Candlefish, *see* Eulachon
Cannon, A., 93, 140, 195, 196, 239, 240, 274
Cannon, D., 46, 98, 105, 107, 110, 111, 115, 142
Cape Arago site, 256
Capes, K., 209, 221, 268
Carlisle, R., 58
Carlson, C., 70, 74, 76, 77, 123
Carlson, R. L.
  direct route, 61, 62
  historical position, 42, 43, 44, 45, 47
  Kimsquit locality, 277, 280
  Marpole phase, 201, 202, 218, 221

Mayne phase, 98, 115, 116, 147, 161, 165
Namu site, 62, 67, 92, 93, 140, 195, 239, 274
North Coast Microblade Tradition, 82, 83, 94
Pebble Tool tradition, 68
San Juan phase, 267, 268, 269, 271
Stemmed point tradition, 67
Casteel, R., 73, 74, 107
Cattle Point site, 41, 268, 269
Catto, N., 60
Chapman, M., 123
Charles culture, 116
Charlton, A., 157, 268
Chatters, J., 208, 221, 271
Chisholm, B., 30
Chitons 24, 137
Christenson, A., 140, 177, 302
Chuck Lake site, 86–87, 300, 301
Clague, J., 64, 83, 84, 148
Clark, D., 65
Clark, G., 66
Clark, J. G. D., 72
Clark, L., 257
Clarke, A., 226
Clarke, L., 226
Clinocardium nuttallii, 23, 90, 109, 111, 118, 119, 120, 137, 170, 191, 223, 137, 263
Clovis complex, 49, 53–56, 58, 300
Cohen, B., 19
Cohoe Creek site, 88–90
Collector adaptation, 114
Columbia Valley prehistory, 181
Connolly, T., 228, 229
Conover, K., 93
Cook, S., 191
Co-op site, *see* Lachane site
Coquille River sites, 255
Cosmos Cove weir, 195
Council site, 136, 284
Coupland, G., 31, 233, 311
Bornite phase, 90, 91
egalitarian corporate group model, 149–150, 296, 306, 309, 310
Gitaus phase, 129–131
herring, 165
historical position, 44, 46
Kleanza phase, 236, 237, 238
McNichol Creek site, 279, 280, 282
Marpole phase, 202, 203, 209, 224
Paul Mason phase, 175, 183, 184, 185, 186, 187–191, 241
Skeena phase, 131–132, 141
Crabtree, R., 147
Crescent Beach site
evidence of salmon storage, 169
Late component, 269
Locarno Beach component, 169–177
Locarno Beach fish, 172–175
Marpole component, 213, 223
seasonality, 175
shellfish sidebar, 170–172
St. Mungo component, 98, 101, 106, 111–115, 116, 303
Cressman, L., 40, 41, 43, 46, 67, 68, 79, 84
Crockford, S., 111, 169, 172
Croes, D., 303
barnacles, 170, 176
economic model described, 151–152, 195, 197, 244, 296, 303, 310
economic model evaluated, 245–246
Hoko River site, 180, 194
Lachane basketry, 231–233, 242, 303, 309, 310, 312
perishables, 45, 46, 178, 179, 180, 221, 297, 312
stored salmon, 168, 169, 177
Cluster analysis sidebar, *see* Multivariate analysis
Cryptochiton spp., 24, 137
Curtin A., 116, 283
Cushman, K., 58
Cybulski, J., 45, 116, 138, 161, 182, 209, 214, 233, 234, 280, 281, 282, 283, 284

Daax Haat Kanadaa site, 287–292
Dahrendorf, R., 309
Daugherty, R., 48, 67
Davis, S., 45, 85, 86, 193, 240
Davis, K., 309, 310
Deans, J., 37
Deer, 4, 67, 73, 74, 76, 87, 93, 94, 107, 110, 118, 122, 123, 127, 133, 140, 142, 194, 196, 226, 251, 257, 258, 262, 271, 281, 282, 283
Deetz, J., 180
De Laguna, F.
Angoon area, 255, 287–291
ethnographic work, 40, 41, 307, 314
historical position, 36, 40, 41, 43, 46
Old Town site, 292–294, 306
sidebar 40–41
Dalles Roadcut site sidebar, 79
Delphinidae, 76; *see also* Porpoise
Deep Bay site, 211, 221, 223, 224, 269
Denali complex, 65–66, 300

Denman Island site, 123
Developed Northwest Coast Pattern
  introduced, 5–8
  described, 22–29, 34–36
DeVore, E., 4
Dewhirst, J., 45, 122, 178, 225, 226, 272, 273
Dikov, N., 82
Dillehay, T., 58
Dionisio Point site, 208
DiSo 1 (Hesquiat village), 272
DiSo 9, 226, 227, 272–273
Dodge Island site, 126, 233
Dogfish shark, 76, 114, 123, 239; *see also* *Squalus* spp.
Dolphin, *see* Porpoise
Donahue, J., 58
Donald, L.
  household size, 25, 191
  importance of salmon, 22, 29
  social structure, 6, 7, 19, 2526, 27, 28, 29, 30, 150, 151, 191, 234, 298, 309
Dowda-Rea, L., 50
Draper J., 46, 121, 255, 256
Driver, J., 60
Drucker, P.
  archaeology, 37, 38, 41, 147, 155, 227, 230
  Northwest coast cultures, 11, 15, 28, 29, 227, 286
Drucker, R. M., 227
Duff, W., 156, 166, 231, 284
Duwamish No. 1 site, 271–272
Dyen, I., 36, 153, 248
Dyson-Hudson, R., 152
Dyuktai site, 66

Earle, T. K., 29
Early littoral stage, 118
Eayem phase, 117
Echo Bay site, 123
Eells, M., 37
Eldridge, M., 101, 123
elk (wapiti, *Cervus elaphus*), 2, 51, 67, 74, 93, 107, 111, 118, 122, 127, 142, 228, 251, 257, 258, 262, 271
Ellen, R., 18
Eopsetta jordani (Petrale sole), 258
Erlandson, J., 133, 194, 239, 270, 291, 294
Esilao site, 117
Ethnicity from basketry sidebar, 180
Eudey, A. A., 121
eulachon, 21, 23, 74, 77, 81, 107, 111, 114, 223, 234, 282, 283
Exchange Cove weir, 194–195

False Narrows site, 208, 209
Fats 17, 284–285
Favorite Bay weir, 194–195
Fedje, D., 83, 84
Fish traps, tidal, 239
Fish weirs, early use of, 194–195
Fisher, *see Martes* spp.
Five Miles Rapids site, 79
Fladmark, K., 40, 60, 218
  coastal route, 62, 64
  Early Coast Microblade Tradition, 83, 84, 87–91
  Graham Tradition, 136, 137, 138, 139, 141, 142, 192, 193, 311
  North Coast prehistory, 183, 191, 192, 234, 279
  Richardson Ranch site, 285, 286
  salmon abundance model, 147–148
    evaluation, 243–244
  Transitional complex, 136, 139
Flenniken, J., 176
Flounder, *see* Starry flounder
Foit, F., 8, 61, 67
Forager adaptation, 114
Fortifications
  Gulf of Georgia, 269, 270
  Southeast Alaska, 291
  locations, 306
Fossil Bay site, 213
Fowke, G., 38, 209
Fraser Valley prehistory, 181
Frederick, S. G., 98, 114, 115, 118, 166, 173, 176, 296, 302; *see also* Boehm, Calvert
Freed, J. A., 40, 43, 287, 292, 294
Freshwater mussel, 122
Fried, M., 5, 25, 309
Fur seal (*Callorhinus ursinus*), 21, 24, 76, 77, 81, 118, 120, 122, 226, 228, 257, 259, 267, 272

Gadidae, see Pacific cod
Gadus spp., *see* Pacific cod
Gallison, J., 86, 87
Garden Island site, 278–279
Garfield, V., 280, 281
Gargett, R., 244, 309
Garrison subphase of Marpole, 212
Garrison Bay site, 208, 209, 223, 269
Gaston, J., 200
Georgeson Bay site, 157, 176
Gershowitz, H., 50
Gessler, N., 64
Ghiselin, M., 19

Gilman, A., 150
Gitaus site, 129, 236
Gitaus phase, 129
Gleeson, P., 45
Glenrose Cannery site
  Marpole component, 213, 223
  Old Cordilleran component, 69–74, 300, 301
  St. Mungo component, 98–110, 301, 302, 303
Goebel, T., 53, 57, 58, 82
Godfrey-Smith, D., 90
Gould, R., 118, 248, 251, 255, 256, 307, 310
Grabert, G., 78, 79, 100, 117
Graham Tradition, 136, 192, 311
Grant Anchorage site, 238, 239
Grebe, 271
Greenberg, J., 36, 50, 65, 95, 153, 300
Greengo, R., 117, 313
greenling, 76, 87, 114, 118, 257, 267
Greenspan, R., 80, 119, 120
Greenville Burial sidebar, 283–284
Greenville site, 280–284
Grinder, *see* Starry flounder
Grosso, G., 45
Groundhog, 236, 237
Ground Hog Bay site, 62, 84–85, 300, 311
Ground slate knives, 101, 103
  absence in St. Mungo, 115
  importance for fish processing, 115, 176
  Locarno Beach phase, 176
Guinn, S., 272
Gulf Island complex, 156, 177
Gulf of Georgia
  culture, 267–270
  emergence of distinctive cultures, 98–118
  refuge sites, 269–270
Gunn, J., 58
Gunther, E., 37, 251, 267
Gunther Island projectile points, 256, 257
Gustafson, C. E., 67

Hackenberger, S., 303
  economic model described, 151–152, 195, 197, 244, 296, 303, 310
  evaluated, 245–246
  stored salmon, 169, 177
Hadleigh-West, F., 65
Haggarty, J., 214
  Georgeson Bay site, 157, 163, 176
  Hesquiat locality, 225, 226, 272, 281, 287, 296
  historical position, 45, 46
Hagwilget Canyon site, 131
Hake, 118, 119
Haley, S., 59
Hall, R., 214
Halibut, 21, 22, 23, 32, 118, 133, 137, 169, 245, 246, 251, 286, 296, 306
Halpin, M., 281, 283
Ham, L., 46, 90, 182, 246
  Beach Grove site, 207, 208
  Crescent Beach site, 269, 270, 312
  Glenrose site, 74, 108, 109
  shellfish seasonality, 74, 109
  St. Mungo site, 98, 106, 107, 110, 111, 115, 142, 303
Hamilton, S., 260, 311
Hamilton, T., 44, 62
Hanson, D., 243
Hanson, G., 227
Harbor seal (*Phoca vitulina*), 24, 73, 76, 80, 93, 122, 127, 140, 191, 195, 226, 239, 257, 258, 262, 271, 282, 287, 292
Harington, C. R., 59
Harper, J., 83, 84
Hart, J., 21, 22, 31, 87, 90, 114, 194
Hatzic Rock site, 117, 303
Haury, E., 66
Hayden, B., 8, 176, 197, 244, 304, 309
Haynes, C. V., 53, 58
Hebda, R., 70, 83, 84, 108, 114, 193
Hedgpeth, J. W., 30
Heizer, R. F., 13, 28, 191
Helen Point site, 115
Henry, D., 8
Herring, 21, 22, 77, 80, 87, 110, 111, 114, 118, 119, 133, 140, 156, 157, 165, 166, 167, 175, 195, 123, 224, 227, 263, 269, 281, 292
Hesquiat Village site (DiSo 1), 272
Hesquiat locality, 225–226, 272–273
Hester, J. J., 45, 46, 91
Heusser, C., 83, 84
Hidden Falls site
  component I, 85–86
  component II, 132–133
  component III, 193–194, 239–240, 294
Hill site, 214
Hill, J., 154
Hill-Tout, C., 38, 200
Hippoglossus stenolepis, *see* Halibut
Hobler, P., 31, 45, 239, 274, 275, 277
Hoffecker, J., 53, 57, 65
Hoko River rockshelter, 267
Hoko River site, 151, 168, 169, 180

Holm, M., 203, 206, 207, 208
Honna River site, 136
Hopetown site, 123
Hopkins, D., 53
Horse clam, *see Tresus* spp.
Houses
  historic Tsimshian,
    Kitkatla, 279
    Nass River, 279
  Marpole phase, 208
  Meier site, 260–262
  Nutlitliquotlenk, 277, 280
  Ozette, 264–267
  Paul Mason features, 187, 189–191
households, ethnographic, 25, 191, 308–309
  archaeological, 308–309
Howes, D., 83, 84, 169, 198
Huelsbeck, D., 45, 266, 267, 311
Hunters and gatherers, 4–5
Hydrolagus colliei, 118, 195, 239
Hypomesus pretiosus, *see* Surf smelt

Imamoto, S., 73, 107
Inglis, R., 44, 126, 129, 183, 191, 229, 231, 233, 234, 278, 279
Irvine, C. M., 59, 109
Isaac, B., 46
Ives, J., 129, 141, 185, 186

Jack mackerel, *see Trachurus symmetricus*
James, M., 58
Jekyll's Lagoon site, 268
Jelinek, A., 53, 59
Jewitt, J., 7
Johnson, A., 29
Johnson, W., 58
Johnstone, D., 161, 208, 209, 215
Jonaitis, A., 6, 26
Jorgensen, J., 11, 15, 16, 20, 163

Kasta site, 88–90
Katharina spp., 24, 137
Keen, S., 109
Kendall, D. G., 211
Kenny, R., 157
Kew, M., 31, 35, 284
Kidd, R., 78, 202, 262
Kidder, A., 38
Kimquit site, 274–277
King, A., 41
King, S., 279, 280
Kinkade, M. D., 35, 36, 153, 248
Kirch, P., 149
Kitandach site, 126, 231
Kitkatla houses, 279
Kitselas canyon, 129–132, 236
Kleanza phase, 236–238
Knowler, W. G., 50
Knusel, C., 182, 210, 241, 242, 303
Kornbacher, K., 202, 208, 218
Krieger, A. D., 41
Kroeber, A. L.
  Northwest Coast culture area 11, 12, 13, 14, 15, 16, 18, 19, 20, 21, 31, 32, 38
  origins of culture, 146, 148, 153, 154, 243
Kruskal, J. B., 211
Kullar, L., 46, 98, 105, 107, 110, 111, 115, 142
Kwatna phase, 274–277
Kwatna sites, 274–277

Labrets
  absence in St. Mungo phase, 115, 116
  evidence for use, 115
  labrets and labret wear sidebar, 116
  presence in Locarno Beach phase, 116
  presence in Mayne phase, 115
  status in Locarno Beach phase, 181
Lachane/Co-op site
  Period I, 278–279
  Period II, 191, 192, 231
  Period III, 126, 128
Lachane perishables sidebar, 231–233
Lane, K., 40, 43, 287, 292, 294
Larsen, C., 100, 117
Lawn Point, Kasta, and Cohoe Creek site sidebar, 88–90
Lawn Point site, 88–90, 139, 240
Leatherman, K. E., 51
LeClair, R., 101, 117
Lee, R., 4
Legros, D., 150
Lenski, G., 5, 8
Lenski, J., 5, 8
Leonhardy, F., 70
Leptocottus spp., 80; *see also* Sculpin
Lightfoot, K., 303
Lightfoot, R., 132, 134, 135
Lime Kiln site, 268
Limpets, 24, 137
Lind Coulee site, 67
lingcod, 118, 257
Little Beach site, 178
Little Qualicum site, 269–270
Littleneck clam, *see Protothaca staminea*
Littorina sitkana, 194
Liverman, D. G. E., 60

Locarno Beach phase,161, 176
description, 154–177
discussion, 303, 304
ethnicity, 178–181
faunal analyses, 156, 165
mortuary practice and use of labrets, 161, 181–182
origins sidebar, 163–165
Locarno Beach site, 154, 161
Long, A., 57
Longacre, W., 154
Long Harbour site, 208, 209, 223, 225
Ludowicz, D., 161, 169, 175, 201, 203, 208, 211, 212, 223
Luebbers, R., 140, 239, 274
Lyman, R., 117, 121, 122, 245, 255, 256, 257, 258, 259, 260, 304
Lynch, T., 58

McAllister, N., 226
McGeein, D., 40, 43, 287, 292, 294
McIlwraith, T., 93
McMillan A., 90, 161, 177, 178, 208, 221, 273
McMurdo, J., 115, 157, 202
McNeary, S., 238, 279, 280, 283
McNichol Creek site, 279–280
MacDonald, G., 231, 233
historical position, 44, 45
Honna River site, 136
Ninstints site, 284
Prince Rupert Harbour, 126, 127, 129, 142, 183, 191, 229, 230, 278, 279
burials, 234, 236
Mackaye site, 268
MacNeish R., 82
Mackie, A., 98, 101, 163
Macoma nasuta, 119; *see also* Bent-nose clam
Maquinna, Nootka chief, sidebar, 7
Margaritifera margaritifera, 122
Marial site, 118
Marmota spp., 237
Marpole phase, 201, 218
art sidebar, 203–208
dating, 203, 218
evidence for status, 209–210, 304
house remains, 208
interassemblage variability, 211–218
perishables, 219–221
subphases, 212
subsistence and seasonality, 222–224
Marpole site, 208
Marten, 237
Martes spp., 237
Martin, J., 4, 96
Martin site, 262–264
Marymoor site, 117
Mason, A., 101, 117, 174
Mason, O., 12
Matthews, J. V., 53
Mathewes, R. 60, 64, 83, 193
Mathews, W. 55, 60, 64, 84
Matson, R. G., 116, 169
Crescent Beach site, 99, 106, 107, 169, 312
Glenrose site, 70, 79, 81, 98, 99, 103, 106, 107, 109, 115, 223, 245, 301
historical position, 43, 45, 46
Locarno Beach phase, 155, 156, 157, 160, 161, 163, 169, 172, 175, 177
Marpole phase, 201, 202, 203, 208, 209, 210, 211, 212, 215, 217, 223
positive feedback, 150, 310
resource ownership model, 152, 245
evaluation, 245, 246
salmon use and storage, 148, 173, 174, 176, 177, 198, 243, 246, 296, 305
Mauger, J., 266
Maurer site, 117
May, J., 126, 192, 234
Mayne phase, 98, 115–117
Meany, E., 7
Mehringer, P., 8, 61, 67
Meighan, C., 45
Meier site sidebar, 260
Meier site, 260–262, 305
Meltzer, D., 58, 59
Merluccius spp. 118; *see also* Hake
Midshipman, 114, 175, 223, 227
Millard Creek site, 221
Miller, J., 32, 256
Milliken site, 78–79
Minard site, 262–264
Minor, R., 67, 79, 80, 118, 119, 120
Mitchell, D. H., 78, 115, 147, 181, 182, 201
Bowker Creek site, 157, 165, 176
Dionisio Point site, 208
Gulf of Georgia culture type, 267, 269, 270
historical position, 43, 44, 46
Hoko River site, 169
importance of salmon, 22, 29
Locarno Beach components, 198
Marpole phase, 201, 202, 203, 209, 210, 213, 215, 246
Montague Harbour site, 99, 156, 157, 160, 161, 163, 176, 201, 268
Northwest Coast culture area, 19, 20
Obsidian culture, 122, 123, 177, 227

Mitchell, D. H. (*continued*)
Puddleduck site, 166
Queen Charlotte Strait culture, 273, 274
social structure, 6, 25, 26, 27, 28, 29, 30, 151, 191, 234, 262, 280, 284, 298
trench embankment sites, 270, 274
Whalen Farm II, 218, 219
Mobley, C., 66
Mochanov, Y., 66
Mohave Lake material, 67
Monks, G., 109, 221, 224, 268, 269, 270
Montague Harbour site
Gulf of Georgia component, 268
Locarno Beach component, 156, 176
Marpole component, 201, 202, 212–214
Mooney, J., 6, 14
Moore site, 268
Moore, W., 309, 310
Morlan, R., 59
Morse, H. G., 50
Moss, M., 46
Alaskan limited activity sites, 294, 295, 314
Alaskan weirs, 194, 195, 197
Daax Haat Kanadaa site, 287, 290, 291, 292
defensive sites, 270, 291
Hidden Fall II fauna, 133
Hidden Falls III fauna, 193, 194, 240, 241, 294
increase in warfare, 296, 314
Yaay Shanoow, 287, 290, 291
Muller-Beck, H., 53
Multidimensional scaling/cluster analysis sidebar, 15–18
Munson, C. A., 58
Murdock, G., 286
Murray, J. S., 138
Murray, R., 101, 157
Musqueam NE (DhRt 4) site, 176
perishables, 180, 219
Mytilus californianus (California mussel), 23, 101, 106, 118, 122, 126, 137, 191, 225, 226, 227, 241, 258, 273, 286, 289
Mytilus edulis (bay mussel),23, 74, 87, 90, 108, 109, 110, 119, 120, 128, 136, 137, 194, 224, 271, 282
Crescent Beach site, 111, 170, 172, 175

Namu site
earliest occupation, 62, 91–94300, 303, 311
last occupation, 274
Periods 3, 4, 139–140
Period 5, 195–196
Periods 5, 6, 239
Native oyster, 262
Nawitti raid sidebar, 28
Nelson, C. N., 68, 272
Nelson, D. E., 59
Nelson, N. C., 66, 82
Nelson, S., 45, 46, 91
Nenana Complex, 57–58, 311
Netarts Sandspit site, 259–260
Newman, Thomas M., 46, 259
Newman, Thomas S., 262, 264
Ninstints site, 284
Nolan, R., 35
Nonrenewable resources, 307–308
Nordquist, D., 221
North Coast houses sidebar, 280
North Coast Microblade Tradition,
definition, 82–84
significance, 300, 301, 311
summary, 94
Northwest Coast archaeology, history
central coast, 38, 42
early period, 38–41
north coast, 41, 43, 44, 45
south coast, 41, 46
Northwest Coast Culture area,
Central Coast defined, 3, 20
cultural commonalities, 24–29
cultural differences, 29–32
defined, 1, 15–19
Drucker, 15
Jorgensen, 15–19
Kroeber, 13–15
Wissler, 12–13
description, 2–4, 21–36
environmental commonalities, 21–24
environmental differences, 29–32
North Coast defined, 3, 20
resources sidebar, 22–24
South Coast defined, 3, 20
south of the Columbia river, 19–20
Nucella spp., *see also* Whelks, 23, 137, 170
Nutlitliqotlenk site, 274, 277, 280

O'Connor site, 123
Oberg, K., 194
Obsidian Culture, 122–124, 177, 227
Obsidian and Locarno Beach cultural comparison sidebar, 177
Olcott sites, 78
Old Cordilleran culture
description, 68–81
significance, 300, 301
summary, 81

Old Crow Yukon 'sites', 59
Old Man House site, 271
Old Musqueam subphase of Marpole,212, 214–215
Old Town site, 287, 289, 292–294
Olivella spp., 119, 122
Olson, R., 294
Osborne, C., 40, 43, 287, 292, 294
Osborne, D., 67, 147
Osmeridae, 282, 283
Ostrea spp., 262
Ozette site sidebar, 264–267
Ozette site, 225, 262, 264–267
  salmon bones 168

Pacific cod, 21, 23, 76, 81, 87, 132, 193, 194, 282, 283, 296, 300
Pacific halibut, *see* Halibut
Palmrose site, 228–229, 241, 260, 311
Patenaude, V., 101, 157
Paul Mason phase, 183–191, 304
  artifacts 186–189
Paul Mason site, 90–92, 304
  Bornite phase, 90–92
  Gitaus phase, 129, 130, 131
  house features, 187, 189–191
Peacock, W. 157
Pender Canal site, 116, 303
Pendegast, D., 45
Penn Cove site, 269
Perch, 80, 114, 118, 119, 257
Percy, R., 98, 99, 106, 161, 182
Petrale sole, 258
Pettigrew, R., 181
Pettitt, D., 50
Phebus, G., 227
Phoca vitulina, *see* Harbor seal
Piddocke, S., 28, 309
Pistol River site, 255
Platichthys stellatus, *see* Starry flounder
Podiceps spp., 271
Point Grey site, 224
Point St. George site sidebar, 248–251
Point St. George site, 118, 248–255
Pokotylo, D., 78
Pomeroy, J., 239, 310
porpoise, 21, 76, 93, 119, 122
Port Orford site, 256
Powers, W., 53, 57, 58, 65, 82
Pratt, H., 79, 98, 99, 100, 105, 106, 107, 111, 115, 156, 161, 223, 245
Pre-Clovis sites sidebar, 58–59
Price, T., 5
Prince Rupert Harbour burials sidebar, 233–234
Prince Rupert Harbour sites,
  Period I, 278–281
  Period II, 191–192
    evidence of warfare, 233
    subsistence evidence, 191
  Period III settlement evidence, 128
Protothaca staminea (littleneck clam), 23, 88, 90, 109, 111, 118, 119, 136, 170, 194, 227, 228, 271
Protowestern Tradition, 66–68, 300
Puddleduck site, 166

Qai'dju site, 284, 286
Queen Charlotte Islands sites
  continuation, 284–287
  Graham Tradition, 136–138
  midden analysis sidebar, 285
  Moresby Tradition, 87–91
  Transitional complex, 139
Queen Charlotte Straight culture, 273–274
  refuge sites, 273–274

Rabich-Campbell, C., 240
Radiocarbon dating sidebar, 57–58
Raetz, R., 260, 311
Raid, historic Northwest coast example, *see* Nawitti
Rankin, L., 98, 99, 105, 106, 107, 111, 161, 170, 172, 223, 245
Rat fish, 118, 195, 239
Refuge sites
  Gulf of Georgia, 269–270
  Queen Charlotte Strait, 273, 274
  Southeast Alaska, 287–291
Renker, A., 267
Resources sidebar, 22–24
Retherford, R., 195
Rice, D., 67, 68
Richardson, A., 26, 195
Richardson Ranch site, 285–286
Riches, D., 33, 34, 153
Ricketts, E., 30
Riddell, F., 40, 43, 287, 292, 294
Ridley Island site, 126, 234
Rippeteau, B., 57
Roberts, L., 187
Robinson, E., 40
Rock cockle, *see Clinocardium nuttallii*
Rockfish, *see Sebastes* spp.
Roe, M., 86, 87
Rogers M., 66

Roll, T., 45, 262, 263, 264
Rosie's rockshelter, 135–136
Rosman, A., 153, 154
Ross R., 46, 117, 118, 255, 256
Ross site, 255
Rouge River (Marial) site, 80
Routes for human colonization of the Northwest Coast
  coastal route, 62–65
  direct route, 61–62
  ice free corridor, 59–61
Rubel, P., 153, 154
Rubin, M., 67
Rutter, N., 60
Ruyle, E., 25, 28, 150, 151

Sahlins, M., 29
St. Claire, D. 161, 177, 178, 208, 221, 273
St. Mungo phase
  description, 98–115
  seasonality, 114
St. Mungo site, 98–100, 103–111
Salmon, 2, 13, 29, 30, 33, 78, 81, 94, 95, 121, 125, 141, 142, 143, 145, 146, 147, 148, 149, 151, 152, 154, 181, 183, 187, 195, 197, 198, 213, 224, 134, 238, 239, 241, 242, 243, 244, 245, 246, 251, 254, 256, 257, 264, 272, 295, 296, 297, 298, 301, 302, 303, 304, 305, 306, 310, 312
  Angoon locality, 292
  availability, 31–32, 277
  Bear Cove site, 76
  Blue Jackets Creek site, 137
  chinook, 22, 80, 255
  chum (dog), 22
  coho, 22, 80, 255
  Crescent Beach site, 111, 114, 172, 173, 174, 175
  Dalles Road cut site,79
  description, 21, 22
  Duwamish No. 1 site, 271
  Glenrose site, 73, 77, 107, 223, 224
  Hesquiat locality, 227, 272
  Hidden Falls site, 133, 193, 240, 241
  Hoko River site, 169, 267
  Little Qualicum river site, 269, 270
  Locarno Beach phase, 156, 161, 165, 166, 169, 172–177
  Marial site, 80
  Namu site, 93, 128, 140, 195, 196, 196, 239
  Obsidian Culture, 123
  ownership of fishing locations, 26
  Ozette site, 266
  Palmrose site, 229
  Paul Mason site, 186
  pink, 22
  Queen Charlotte Islands, 32, 137, 284, 286, 297
  Rosie's rockshelter, 136
  salmon area, 12
  Seal Rock site, 257, 258
  sockeye, 22
  St. Mungo site, 110, 11
  storage, 148, 151
    sidebar, 166–169
  Tahkenitch Landing site, 120
  Whale Cove site, 122
  Yaquina Head site, 119
Samuels, S. R., 45, 264, 266, 267, 311
San Dieguito site, 66–67
Sand Point site, 225
Sanger, D., 43
San Juan phase, 267–270
San Juan phase sidebar, 269
Sapir, E., 153
Sarkar Entrance site, 240
Saxe, A., 210
Saxidomus giganteus (butter clam),23, 87, 118, 136, 170, 227, 292
Schalk, R., 21, 30, 32, 33, 46, 148, 150, 153
  salmon storage model, 148
Schenck, W., 40, 41
Schreindorfer, C., 79
Schumacher, P., 37
Schweger, C., 53
Scudder, G., 64
Sculpin, 76, 80, 81, 87, 114, 119, 174, 175, 257
Seaburg, W., 32, 256
Sea lion
  California (*Zalophus californianus*),22, 24, 118, 122
  Steller (*Eumetopias jubatus*), 22, 24, 76, 81, 87, 93, 118, 122, 127, 228, 251, 257, 258, 282
Seal Rock site, 257–258
Sea urchins 23, 137, 191
Sebastes spp., 2, 21, 23, 76, 77, 81, 87, 92, 118, 123, 133, 140, 196, 251, 257, 272, 286, 296
Seguin, M., 281, 283
Sendey, J., 163, 176, 214
Service, E., 29
Severs, P., 45, 136, 137, 139, 183, 192, 240, 284
Seymour, B., 202, 219

SgA'ngwa-i (Ninstints), 284
Shaw, R., 262
shellfish seasonality sidebar, 109
Sheppard, J., 67
Shoemaker Bay site, 177–178, 208, 209, 221
Simonsen, B., 238, 308
sites, as unrenewable resources, 307–308
Sitka periwinkle (*Littorina sitkana*), 194
Skeena River phase, 129–132, 185–186
Skeena River phase sidebar, 185–186
Skoglund's Landing site, 139
SL!'indAgaw-i site, 286
Smith, C. G., 50
Smith, D. G., 209
Smith, E., 152
Smith, H. I., 38, 40, 146, 200, 208, 209, 218
Smith, J., 82
Smith, M. E., 19
Sneed, P., 22, 30, 202
Snyder, W., 269, 271
Southon, J., 59
Squalus spp., 76, 114, 123, 239
Starry flounder, 23, 74, 77, 80, 108, 111, 114, 118, 119, 165, 169, 173, 223, 245, 258
Status
  Locarno Beach phase, 181–182
  Marpole phase, 209–210
  Prince Rupert Harbour 233, 234, 241
Steifel, C., 156, 157, 165, 166
Stein, J., 312
Steinberg, A. G., 50
Stevenson, A., 239
Steward, J., 4, 5, 18, 40, 41
Stewart, F., 126, 127, 191, 192, 234, 280, 281
Stickleback, 74, 77, 81, 108, 111
Stone clubs, Skeena River area, 231
Strong, W., 40, 41
Strongylocentrotus spp., 23, 137
Stselax phase, 267–270
Stselax site, 267
Stuckenrath, R., 58, 84, 88, 183, 195, 197
Stucki, B., 167, 267
Sturgeon, 74, 81, 111, 114
Styles, N., 107
sucker, 114
Surf smelt, 23, 265, 255, 295
Sutherland, E., 202
Sutherland, P., 137, 138, 139, 141, 142, 147, 183, 191, 192, 193, 234, 279
Suttles, W., 6, 8, 12, 21, 25, 26, 28, 29, 30, 32, 33, 34, 35, 40, 151, 153, 308, 309
Swartz, B. K., 45
Tahkenitch Landing site, 80–81, 118–121
  sidebar 119–121
Tankersley, K., 58
Ta!dasL!n site, 287
Tc!u'uga site, 285
Tc!uga site assemblage sidebar, 285–286
Teit, J., 146, 152, 153, 187
Testart, A., 150
Thais spp. *see Nucella*, Whelks
Thaleichthys pacificus, *see* Eulachon
Thom, B., 157, 202, 209, 219, 269
Thompson, G., 46, 270, 271, 314
Thompson, L,. C. 35, 36, 153, 248
Toepel, K. A., 80, 118, 119, 120
Toleak Point site, 262–264
Tomcod, 80, 118, 119
Tongue Point site, 225
Torgerson, W. S., 211
Tow Hill site, 136, 141, 192, 240
Trace, A., 157, 176
Trachurus symmetricus, 90
Transitional complex, Queen Charlotte islands, 139
Trench embankment sites, 269–270
Tresus spp., 23, 109, 119, 121, 122, 123, 137, 170, 228, 271
True, D. L., 121, 163, 211, 212
Tsable River Bridge site, 166
Tsawwassen site, 116
Tualdad Altu site, 208, 221
Turn Point site, 268
Turner, C., 50, 51, 52, 65
Tutchone social stratification, 150

Umpqua/Eden site, 256

Vayda, A., 309
Vogel, J., 59

Warren, C., 67, 68, 121
Washbrook, K., 32
Water Hazard site, 219
Weide, M., 109
Wenatchee Clovis site, 67
Wessen, G., 45, 225, 264, 266, 267
West, F. H., 65
Whale, 24, 118, 120, 122, 122, 132, 155, 203, 234, 262, 273, 287, 297, 306
Whale Cove site sidebar, 121–122
Whale Cove site, 121–122, 258
Whalen Farm II sidebar, 218–219
Whalen Farm site, 154, 208

Whelks, 23, 137, 140, 191, 226, 227
White, J., 60
White, J., 59
White Rock Village site, 262–264
Wickersham, J., 37
Wigand, P., 67
Wigen, R., 111, 114, 157, 166, 167, 172, 267, 269, 270, 287
Williams, H. F., 108
Williams, R. C., 50
Wilmeth, R., 202, 218
Windust phase, 67
Wissler, F. C., 12, 13, 15, 16, 18, 19, 20, 21, 22, 25, 154
Wissler, M. D., 45
Wolf, E., 150
Wood, J., 149, 150, 152, 310

Xilgwa-i site, 287

Yaquina Head site, 118–119
Yi, S., 66
Yip, A., 46, 98, 105, 107, 110, 111, 115, 142
Young, S. B., 53
Youngs River site, 79–80
Yuquot site
  early component, 122
  later components, 178, 225, 226 272, 273